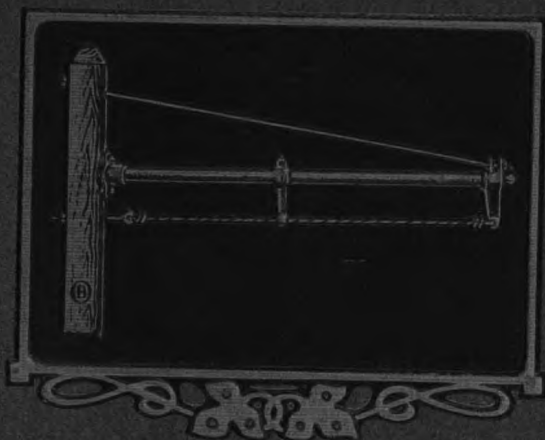


CATALOGUE No. 8.

THE OHIO BRASS COMPANY

MANSFIELD
OHIO, U.S.A.

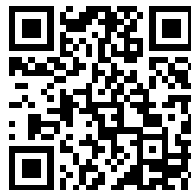


ELECTRIC RAILWAY
& MINE HAULAGE
MATERIAL

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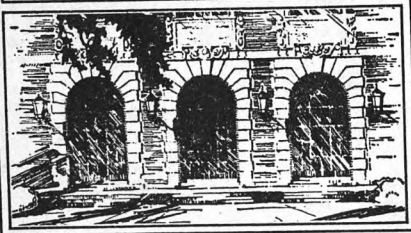


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Catalogue No. 8—April, 1910

THE OHIO BRASS CO.

*Designers, Engineers and
Manufacturers
of a*

*Complete Line of Perfected Appliances Used in
the Construction, Maintenance
and Operation of*

**ELECTRIC RAILWAYS,
MINE HAULAGE SYSTEMS
and
TRANSMISSION LINES**



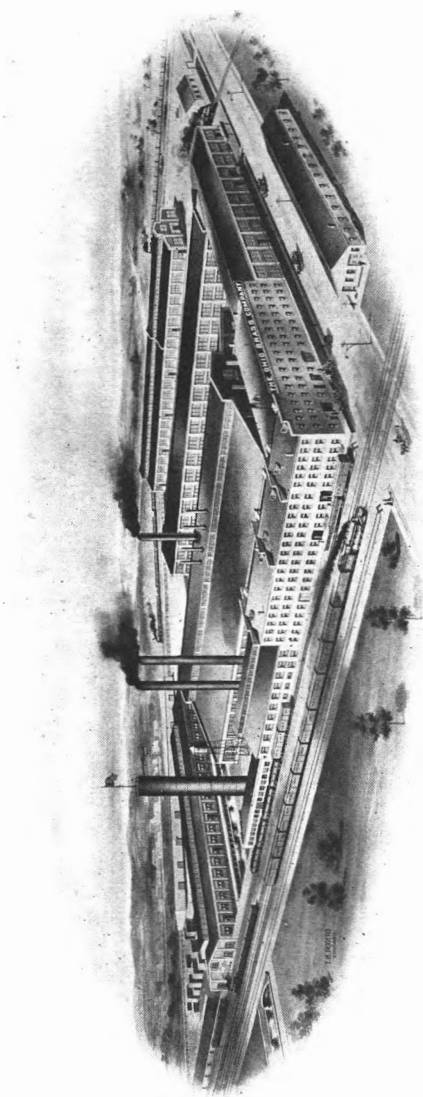
Main Offices and Works
MANSFIELD, OHIO, U. S. A.

Cable Address: "Electric, Mansfield"

Branch Offices

NEW YORK	30 Church Street
CHICAGO	277 Dearborn Street
BURT GELLATLY	306 Fourth Avenue, PITTSBURG
PIERSON, ROEDING & CO.	SAN FRANCISCO, LOS ANGELES, SEATTLE

Sales Agents in Principal Foreign Countries



Area of Floor Space 5 Acres. Area of Grounds 10 Acres

PLANT OF THE OHIO BRASS COMPANY
MANSFIELD, OHIO, U. S. A.

Introductory

IN compiling this Catalogue we have endeavored to confine the materials listed to those which, by extensive use, are generally recognized as standard types, forms and sizes. We have accordingly eliminated such articles as, in the progression of the arts, have become too obsolete for further employment; and, on the other hand, have added a number of new devices and modified forms of what have hitherto been regarded as standard types.

Our plant consists of modern fireproof buildings fully equipped with improved machinery for economical production, and each building is planned and located with relation to the others in such a way as to facilitate the various processes through which our products pass, and to greatly aid in the prompt handling of large contracts and in maintaining the lowest possible prices consistent with the high standard of materials we supply.

The Railway Sales Department is separated into divisions for the different classes of material we manufacture, as follows: "Overhead Line Material Division," "Bond and Insulator Division," "High Tension Insulator Division," "Car Equipment Division," "Foreign Division" and "Mining Division."

Each of these Divisions is in direct charge of men of wide experience in the particular materials they sell, and this arrangement enables us to give prompt and efficient service.

In communicating with us by wire the Code Words shown throughout the Catalogue in connection with the various articles listed may often be used to advantage. We are subscribers to the "A. B. C., Fifth Edition," "Lieber's Standard" and "Western Union" Codes, and in addition have a private code of our own compiling, a copy of which will be furnished upon request.

We trust that you will find this Catalogue fully commensurate with your present and future needs.

THE OHIO BRASS COMPANY

Remarks to Customers

1st—Liability

We exercise the utmost care in packing goods and cannot be held responsible for any damage to them while in transit. At the same time, if such cases are reported to us, we will gladly coöperate with our customers in having all claims adjusted.

2nd—How to Order

It will enable us to ship orders more promptly and with less liability of error if the catalogue number and the name in full of each article are stated; also whether shipments should be made by express or freight, and if a particular route is preferred, same should be specified.

3rd—Telegraphing

The code words distributed throughout this Catalogue, designating the various articles listed, do not conflict with the "A. B. C. Code, Fifth Edition," "Lieber's Standard," "Western Union" or our own private Telegraphic Code, and may be used in connection with any of them, where such use may seem advisable.

4th—Returning Goods

Goods should not be returned without first communicating with us to obtain our approval and the correct shipping directions; at the time such shipment is made, proper notification of it should be forwarded to us, with a memorandum of all the material sent.

5th—Prices

All prices are subject to change without notice. Where quotations have been made by letter or through salesmen, reference to same should be made in the order.

6th—Terms

Accounts are payable thirty days from date of invoice, unless subject to special terms; those overdue are liable to sight draft.

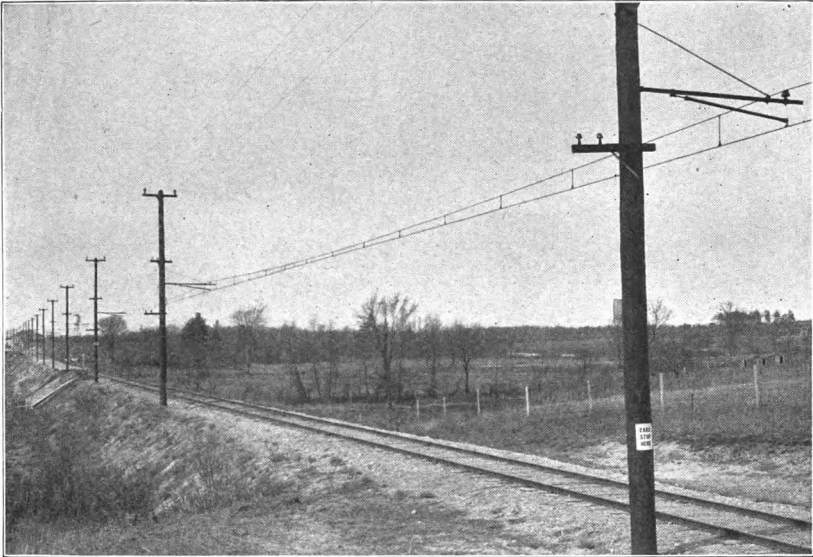
7th—Remittances

Remit by draft, money order, registered letter or express money order.

8th—Financial Standing

If you are not positive that your financial standing is known and acceptable to us, please accompany your first order with good references, or authority to draw with bill of lading, or to express C. O. D. When shipment is to be made with sight draft attached to bill of lading or by express C. O. D., sufficient funds should be sent to cover the transportation charges both ways.

O-B Catenary Material



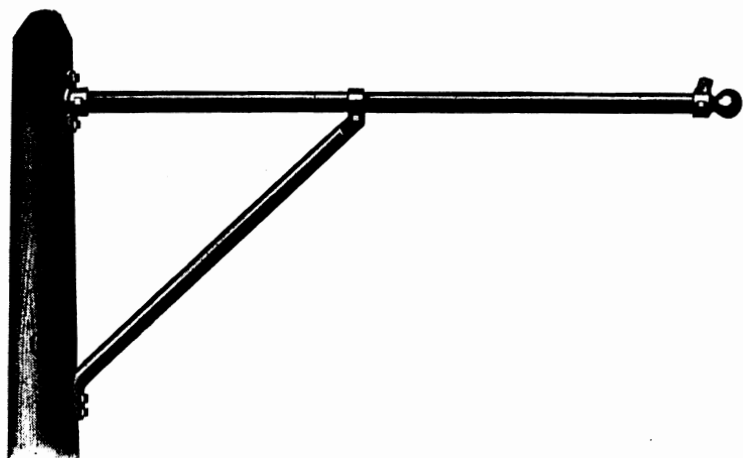
O-B Catenary Material on Chicago, Lake Shore & South Bend Railway Company's Line

*Full line of Latest Approved
Designs of High - Grade
O-B Catenary Material
Described and Illustrated in
Catenary Catalogue No. 20*

Copy Mailed on Request

Rigid Pole Bracket

Single Bracket, for Wood Poles



THE Bracket lengths as listed are the distances from the pole to the outer end of the horizontal arm, but not including the projecting end casting.

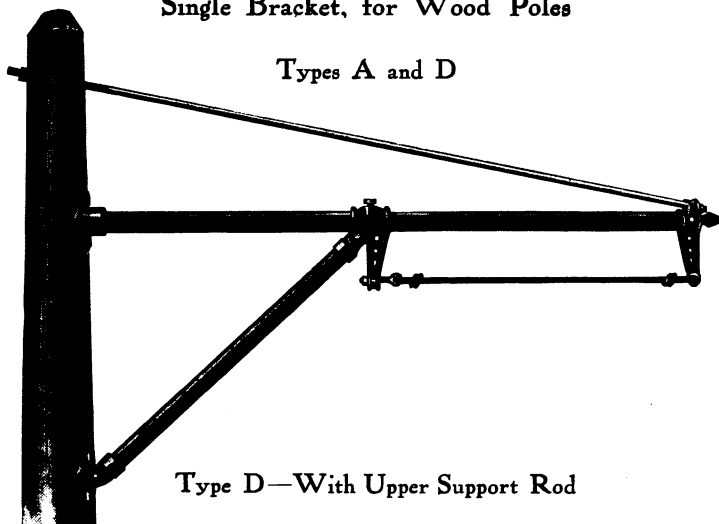
Code Word	No.	List per 100
<i>Aback.</i>	10454—4-foot Arm, 1½-inch A Tubing.....	\$310 00
<i>Abaiser.</i>	10455—6 " " 1½ " "	340 00

Brackets for Iron Poles furnished to order.

Flexible Pole Bracket

Single Bracket, for Wood Poles

Types A and D



Type D—With Upper Support Rod

THE Bracket lengths as listed are the distances from the pole to the outer end of the horizontal arm, but not including the projecting end casting.

Type A—Without Upper Support Rod

Code Word	No.		List per 100
<i>Abast.</i>	3403—	9-foot Arm, 1½-inch C Tubing.....	\$510 00
<i>Abase.</i>	8787—10	" " 1½ " "	540 00
<i>Abash.</i>	3409—9	" " 2 " "	610 00
<i>Abater.</i>	8789—10	" " 2 " "	660 00

Type D—With Upper Support Rod

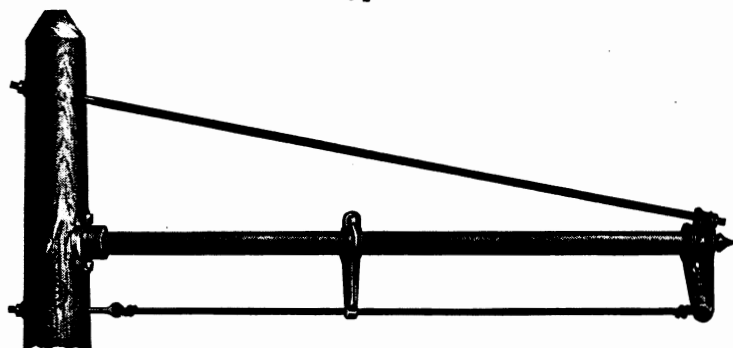
<i>Abature.</i>	3493—	9-foot Arm, 1½-inch C Tubing.....	\$560 00
<i>Abawed.</i>	5521—10	" " 1½ " "	590 00
<i>Abbatial.</i>	3499—9	" " 2 " "	670 00
<i>Abess.</i>	5529—10	" " 2 " "	700 00

Ornamental Brackets and Brackets for Iron Poles furnished to order.

Flexible Pole Bracket

Single Bracket, for Wood Poles

Type B



THE Bracket lengths as listed are the distances from the pole to the outer end of the horizontal arm, but not including the projecting end casting.

Code Word	No.	List per 100
Abbey.	9062— 9-foot Arm, 1½-inch C Tubing.....	\$390 00
Abbot.	9063— 9 " " 1½ " A "	350 00
Abdicate.	9065—10 " " 1½ " C "	410 00
Abditive.	9066—10 " " 1½ " A "	380 00
Abducent.	9071— 9 " " 2 " C "	480 00
Abduct.	9072— 9 " " 2 " A "	430 00
Abductor.	9074—10 " " 2 " C "	520 00
Abeam.	9075—10 " " 2 " A "	460 00

Ornamental Brackets and Brackets for Iron Poles furnished to order.



DIRIGO INSULATION



THE perfection of an insulating compound, possessing all the properties and qualities which a material of this kind should have to make it suitable for use as an insulation in combination with trolley and feeder wire appliances, has been realized in the DIRIGO INSULATION as now produced.

To bring about this result has required elaborate and extended experiments with a great variety of substances, the most careful and exhaustive study of the behavior of the different insulating materials in actual service, and the installation of a separate plant with a large equipment of special machinery for manufacturing the Dirigo; in brief, no means has been left unemployed to bring this material to the highest attainable degree of excellence.

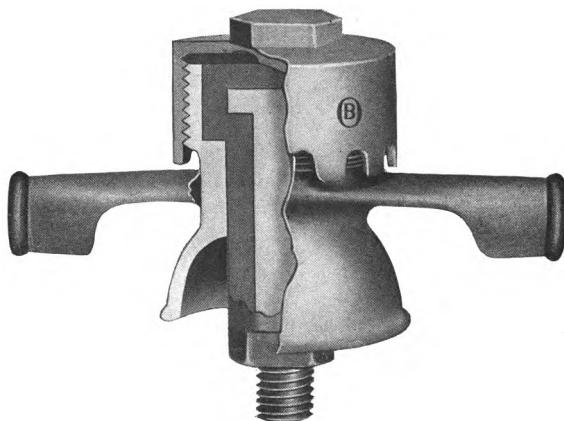
DIRIGO INSULATION possesses Great Tensile Strength, High Insulating Properties, Toughness, Elasticity, and the Ability to Withstand High Heat without softening or deforming even when subjected to great strain. Further it is capable of standing up for an indefinite period in actual service, under extreme loads, against the most severe weather conditions with perfect results, both mechanical and electrical.

Every article made with Dirigo Insulation is subjected to rigid mechanical and electrical tests before being put out, the tests given being from eight to twenty times as severe as working conditions can produce.

The word Dirigo stamped on a piece of Insulation, either separately or in conjunction with the trade mark shown above, is a guarantee of its electrical and mechanical perfection.

Type D Trolley Wire Hangers

Patented



Sectional View of Type D Straight Line Hanger

THE Type D Hanger is made in a number of different forms, as shown on the following pages, to meet the various requirements of service.

It possesses a number of excellent features which render it very efficient, having a hexagonal nut at the lower end of the insulated bolt for the application of a wrench when attaching the ear or clamp to it.

A row of lugs is provided around the lower edge of the cap, one or two of which, when turned under, lock the insulator cap securely in position, thus preventing it from unscrewing and the insulated bolt from working loose.

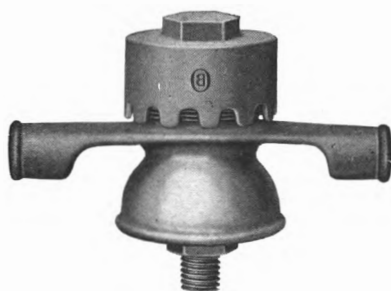
The diameter of the head of the insulated bolt is greater than that of the standard West End Type, and hence presents a larger supporting surface. A leather washer between the cap and head of the insulated bolt prevents injury to the insulation in tightening down the cap.

Type D Trolley Wire Hangers

Patented

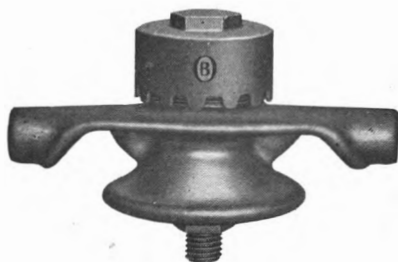
Straight Line

Form 1



Code Word	No.							List per 100
<i>Abearing.</i>	2022—	Form 1	Hanger,	Mall. Iron,	Galvanized,	D Bolt,	$\frac{3}{8}$ -inch Stud	\$100 00
<i>Aberrant.</i>	6460—	" 1	"	"	"	"	"	102 50
<i>Abetment.</i>	2023—	" 1	"	"	Japanned,	"	"	95 00
<i>Abettal.</i>	6461—	" 1	"	"	"	"	"	97 50

Form 2



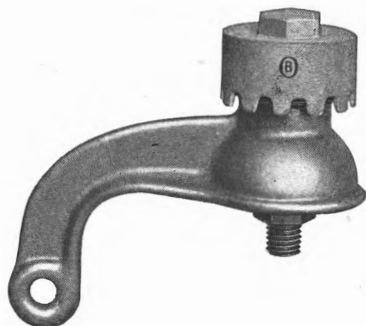
BODY portion is heavier than that of Form 1 and broader skirt affords increased protection to lower end of insulated bolt. Standard Cap and Type D Insulated Bolt are used.

Code Word	No.							List per 100
<i>Aberr.</i>	10380—	Form 2	Hanger,	Mall. Iron,	Galvanized,	D Bolt,	$\frac{3}{8}$ -inch Stud	\$113 00
<i>Abet.</i>	10381—	" 2	"	"	"	"	"	115 50

Type D Trolley Wire Hangers

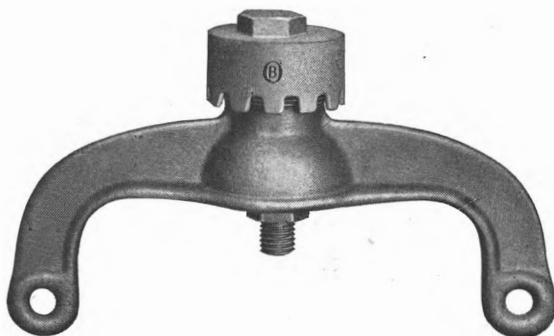
Patented

Single Curve



Code Word	No.					List per 100
<i>Abeyance.</i>	2045—	Single Curve Hanger, Mall. Iron, Galvanized,	$\frac{3}{8}$ -inch Stud	...	\$100	00
<i>Abhorrer.</i>	6496—	" " " " " "	$\frac{3}{4}$ "	...	102	50
<i>Abidance.</i>	2046—	" " " " Japanned,	$\frac{3}{8}$ "	...	95	00
<i>Abigail.</i>	6497—	" " " " " "	$\frac{3}{4}$ "	...	97	50

Double Curve

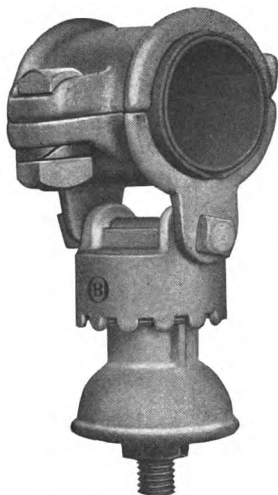


Code Word	No.					List per 100
<i>Abiliment.</i>	2048—	Double Curve Hanger, Mall. Iron, Galvanized,	$\frac{3}{8}$ -inch Stud	...	\$212	50
<i>Abject.</i>	6499—	" " " " " "	$\frac{3}{4}$ "	..	215	00
<i>Abjudge.</i>	2049—	" " " " Japanned,	$\frac{3}{8}$ "	..	105	00
<i>Abjugate.</i>	6500—	" " " " " "	$\frac{3}{4}$ "	..	107	50

Type D Trolley Wire Hangers

Patented

Swiveled Pole Bracket



No. 8864—With Double Insulation

A SECONDARY insulation is provided by means of a double fibre bushing placed inside the upper bracket arm sleeve.

Single Insulation

Code Word	No.	List per 100
<i>Abjure.</i>	8852—Hanger, Mall. Iron, Galv., $\frac{5}{8}$ -inch Stud, for 1½-inch Tubing ..	\$180 00
<i>Ablation.</i>	8858— " " " $\frac{5}{8}$ " " 2 " ..	180 00

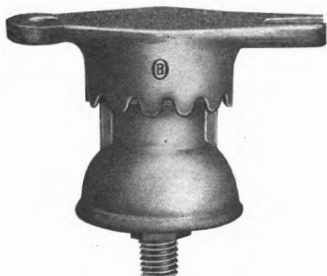
Double Insulation

Code Word	No.	List per 100
<i>Ablaut.</i>	8864—Hanger, Mall. Iron, Galv., $\frac{5}{8}$ -inch Stud, for 1½-inch Tubing ..	\$245 00
<i>Ablaze.</i>	8870— " " " $\frac{5}{8}$ " " 2 " ..	245 00

Type D Trolley Wire Hangers

Patented

Bridge



HHEIGHT from top of Hanger to lower face of hex on insulated bolt is $3\frac{3}{8}$ inches.

Code Word	No.	List per 100
<i>Abloom.</i>	2037—Bridge Hanger, Malleable Iron, Galvanized, $\frac{5}{8}$ -inch Stud.....	\$105 00
<i>Ablude.</i>	6466— “ “ “ “ “ “ $\frac{3}{4}$ “	107 50
<i>Abtush.</i>	2038— “ “ “ “ Japanned, $\frac{5}{8}$ “	100 00
<i>Abode.</i>	6467— “ “ “ “ “ “ $\frac{3}{4}$ “	102 50

Barn



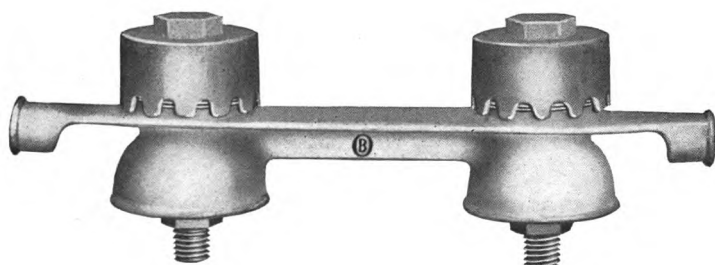
HHEIGHT from top of Hanger to lower face of hex on insulated bolt is 3 inches.

Code Word	No.	List per 100
<i>Ablegate.</i>	6480—Barn Hanger, Malleable Iron, Galvanized, $\frac{5}{8}$ -inch Stud.....	\$80 00
<i>Ableness.</i>	6481— “ “ “ “ “ “ $\frac{3}{4}$ “	82 50
<i>Abolish.</i>	6483— “ “ “ “ Japanned, $\frac{5}{8}$ “	75 00
<i>Aboral.</i>	6484— “ “ “ “ “ “ $\frac{3}{4}$ “	77 50

Type D Trolley Wire Hangers

Patented

Twin Straight Line



PROVIDES a 6 inch separation between two parallel trolley wires. Connecting arm is heavy enough to preclude the possibility of buckling. Hanger bodies are similar to the Standard Type D Hangers described on page 12.

Code Word	No.	List per 100
<i>Ablution.</i>	3185—Twin Hanger, Malleable Iron, Galvanized, $\frac{3}{4}$ -inch Studs.....	\$205 00
<i>Abnodate.</i>	6506— " " " " " " $\frac{3}{4}$ "	210 00

Types D and D-W Insulated Bolts



Type D Bolt



Type D-W Bolt

THE Type D Bolt consists of a forged steel bolt effectively insulated by Dirigo Insulation and is used interchangeably with the various forms of Type D Hangers for attachment to all types of ears and clamps which have an internally threaded boss.

The Type D-W Bolt has a cone-shaped end, internally threaded left hand, which screws down upon the stud bolt of the D-W Clamp listed on page 60, thus operating it. It is not recommended for new construction.

Code Word	No.	List per 100
<i>Abnormal.</i>	2018—Insulated Bolt, Type D, $\frac{5}{8}$ -inch Stud	\$45 00
<i>Abodance.</i>	6457—“ “ “ D, $\frac{3}{4}$ “	47 50
<i>Aborsive.</i>	2019—“ “ “ D-W	45 00

Always specify whether left or right-hand threading is desired in D-W Bolt, otherwise left-hand threading will be furnished.

Types D and M Hanger Wrench



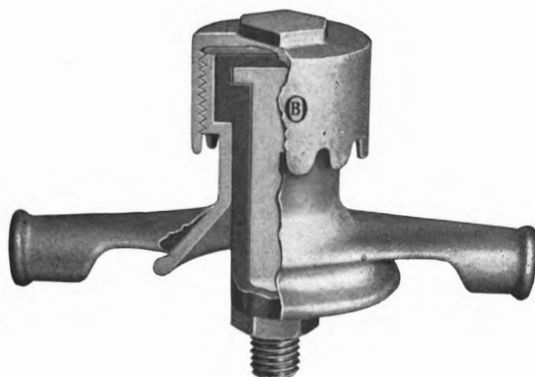
FITS interchangeably the hexagonal nuts on the various insulated bolts and hanger caps on Types D and M Hangers. One wrench is furnished free with each order for Types D or M Hangers.

Code Word	No.	List per 100
<i>Aborted.</i>	2020—Hanger Wrench	\$30 00

Type M Trolley Wire Hangers

Patented

Straight Line



CONSTRUCTED along the lines of the well-known West End Type and possesses all the good features of the Type D Hangers, viz.: A hex nut on top of the cap for the application of a wrench in tightening the cap into place, a hex nut on the lower end of the insulated bolt forging to assist in tightening the insulated bolt into the trolley ear or clamp, and the cap is provided with a series of lugs along the lower edge so that by clinching one or two lugs under, after having tightened the cap, the cap is prevented from unscrewing. In case of the single and double curve hangers, the arms are designed so as to leave ample clearance between the bolt and the arm to prevent the trolley wheel and harp from "wedging," should the wheel leave the trolley wire.

Code Word	No.	List per 100
<i>Abortion.</i>	3166—Straight Line Hanger, Mall. Iron, Galvanized, $\frac{5}{8}$ -inch Stud...	\$100 00
<i>Abounded.</i>	6531— " " " " " $\frac{3}{4}$ " ...	102 50
<i>Abradent.</i>	3167— " " " " Japanned, $\frac{3}{8}$ " ...	95 00
<i>Absentee.</i>	6532— " " " " " $\frac{3}{4}$ " ...	97 50

Type M Trolley Wire Hangers

Patented

Single Curve



Code Word	No.	List per 100
<i>Abraid.</i>	3176—Single Curve Hanger, Mall. Iron, Galvanized, $\frac{3}{8}$ -inch Stud...	\$100 00
<i>Abrest.</i>	6549— " " " " " " " "	102 50
<i>Absand.</i>	3177— " " " " " " " "	95 00
<i>Abstist.</i>	6550— " " " " " " " "	97 50

Double Curve



Code Word	No.	List per 100
<i>Abrieger.</i>	3178—Double Curve Hanger, Mall. Iron, Galvanized, $\frac{3}{8}$ -inch Stud...	\$112 50
<i>Abrogate.</i>	6551— " " " " " " " "	115 00
<i>Absolver.</i>	3179— " " " " " " " "	105 00
<i>Absonant.</i>	6552— " " " " " " " "	107 50

Type M Trolley Wire Hangers

Barn



HHEIGHT from top of hanger to lower face of hex on insulated bolt is $3\frac{3}{8}$ inches.

Code Word	No.					List per 100
<i>Absorber.</i>	3985—	Barn Hanger, Malleable Iron, Galvanized,	$\frac{5}{8}$ -inch Stud	.....		\$105 00
<i>Abstain.</i>	6534—	" " " " " "	"	.....		107 50
<i>Absterge.</i>	3986—	" " " " Japanned,	"	.....		100 00
<i>Abstrude.</i>	6535—	" " " " " "	"	.....		102 50

Type M Insulated Bolt



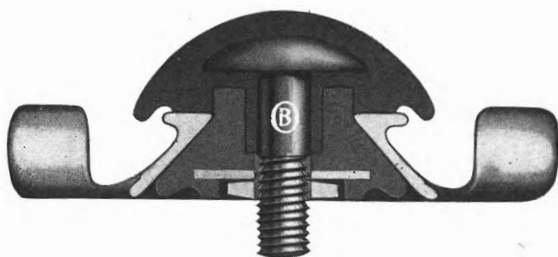
THE portion of the forged steel stud above the hex is covered with Dirigo Insulation. Used with Type M Hangers and also with the various makes of West End Hangers.

Code Word	No.				List per 100
<i>Abutment.</i>	2054—	Insulated Bolt, Type M, $\frac{5}{8}$ -inch Stud	.....		\$45 00
<i>Academic.</i>	6528—	" " " " " "	.....		47 50

The Type D Wrench listed on page 18 can also be used with Type M Hangers.

Type G Trolley Wire Hangers

Patented



Sectional View Showing Lock Cone and Washer

THE Type G Hangers listed on the succeeding pages are made with malleable iron castings, giving maximum strength combined with lightness in weight.

The insulator caps and cones dovetail together, so that surface leakage between the stud bolt and the body casting is practically eliminated. These caps and cones are made of Dirigo Insulation, which in the cap is moulded around the stud bolt. The latter is made with a head which is larger in diameter than the central opening in the hanger body, so that there is no possibility of the stud bolt pulling through the hanger casting, even if the insulation should accidentally become broken.

The various styles of the Type G Hangers and Cones are listed as "Lock" and "Plain." The "Lock" style is shown in the above cut, and differs from the "Plain" only in having a split lock washer added, and in being provided with a recess for this washer in the lower face of the cone and an iron disc moulded in place to provide a bearing surface for the washer. The lower face of the lock washer bears against the top of the boss of the ear or clamp with which the hanger is used.

The Lock Cone is far superior to the Plain Cone because it absolutely prevents the caps from working loose and Hangers thus equipped can be securely installed with great ease.

Type G Trolley Wire Hangers

Patented

Straight Line



Code Word	No.						List per 100
<i>Absume.</i>	10432—	Straight Line Hanger, Galvanized, $\frac{5}{8}$ -inch Stud, Plain Cone..					\$70 00
<i>Absurd.</i>	10433—	"	"	"	"	Lock "	.. 75 00
<i>Aburst.</i>	5446—	"	"	"	Japanned, $\frac{5}{8}$ "	Plain "	.. 67 50
<i>Abuse.</i>	5447—	"	"	"	"	Lock "	.. 72 50
<i>Abuser.</i>	10434—	"	"	"	Galvanized, $\frac{3}{4}$ "	Plain "	.. 72 50
<i>Academy.</i>	10435—	"	"	"	"	Lock "	.. 77 50
<i>Acceder.</i>	5448—	"	"	"	Japanned, $\frac{3}{4}$ "	Plain "	.. 70 00
<i>Accent.</i>	5449—	"	"	"	"	Lock "	.. 75 00
<i>Accite.</i>	10436—	"	"	"	Casting only, Galvanized.....		20 00
<i>Acclaim.</i>	8752—	"	"	"	"	Japanned.....	17 50

Barn



Code Word	No.						List per 100
<i>Accentor.</i>	5454—	Barn Hanger, Japanned, $\frac{5}{8}$ -inch Stud, Plain Cone.....					\$91 00
<i>Accosted.</i>	5455—	"	"	"	"	Lock "	.. 96 00
<i>Accouple.</i>	5456—	"	"	"	"	Plain "	.. 93 50
<i>Accrete.</i>	5457—	"	"	"	"	Lock "	.. 98 50
<i>Accrouch.</i>	8666—	"	"	Casting, Japanned.....			41 00

For description and advantages of Lock Cones, see page 22.

Type G Trolley Wire Hangers

Patented Single Curve



Code Word	No.						List per 100
Accloy.	10437—	Single Curve Hanger, Galvanized,	$\frac{5}{8}$ -inch Stud, Plain	Cone..	\$76 00		
Accoast.	10438—	" " " " " "	$\frac{5}{8}$ " "	Lock " ..	81 00		
Accord.	5462—	" " " " " "	Japanned, $\frac{5}{8}$ " "	Plain " ..	73 50		
Accoy.	5463—	" " " " " "	" " $\frac{5}{8}$ " "	Lock " ..	78 50		
Accruer.	10439—	" " " " " "	Galvanized, $\frac{3}{4}$ " "	Plain " ..	78 50		
Accumb.	10440—	" " " " " "	" " $\frac{3}{4}$ " "	Lock " ..	83 50		
Accurse.	5464—	" " " " " "	Japanned, $\frac{3}{4}$ " "	Plain " ..	76 00		
Accuser.	5465—	" " " " " "	" " $\frac{3}{4}$ " "	Lock " ..	81 00		
Acentic.	10441—	" " " " " "	Casting only, Galvanized.....		26 00		
Acetic.	8665—	" " " " " "	" " Japanned.....		23 50		

Double Curve



Code Word	No.						List per 100
Acerbate.	10442—	Double Curve Hanger, Galvanized,	$\frac{5}{8}$ -inch Stud, Plain	Cone..	\$85 00		
Acetify.	10443—	" " " " " "	" " $\frac{5}{8}$ " "	Lock " ..	90 00		
Acheiver.	5466—	" " " " " "	Japanned, $\frac{5}{8}$ " "	Plain " ..	82 50		
Aching.	5467—	" " " " " "	" " $\frac{5}{8}$ " "	Lock " ..	87 50		
Acidity.	10444—	" " " " " "	Galvanized, $\frac{3}{4}$ " "	Plain " ..	87 50		
Acorn.	10445—	" " " " " "	" " $\frac{3}{4}$ " "	Lock " ..	92 50		
Acquest.	5468—	" " " " " "	Japanned, $\frac{3}{4}$ " "	Plain " ..	85 00		
Acquit.	5469—	" " " " " "	" " $\frac{3}{4}$ " "	Lock " ..	90 00		
Acraze.	10446—	" " " " " "	Casting only, Galvanized.....		35 00		
Acreege.	8664—	" " " " " "	" " Japanned.....		32 50		

For description and advantages of Lock Cones, see page 22.

Type G Trolley Wire Hangers

Patented

Pole Bracket



Code Word	No.	List per 100
<i>Acrimony.</i>	8898—Hanger, Jap., for 1½-inch Tubing, ⅝-inch Stud, Plain Cone....	\$138 00
<i>Acrobat.</i>	8899—“ “ 1½ “ ⅝ “ Lock “ ...	143 00
<i>Actable.</i>	8900—“ “ 1½ “ ¾ “ Plain “ ...	140 50
<i>Activate.</i>	8901—“ “ 1½ “ ¾ “ Lock “ ...	145 50
<i>Actress.</i>	8815—“ Casting, Japanned, for 1½-inch Tubing	88 00
<i>Actuary.</i>	8816—“ Jap., for 2-inch Tubing, ⅝-inch Stud, Plain Cone....	138 00
<i>Actuate.</i>	8817—“ “ 2 “ ⅝ “ Lock “ ...	143 00
<i>Acuity.</i>	8818—“ “ 2 “ ¾ “ Plain “ ...	140 50
<i>Acumen.</i>	8819—“ “ 2 “ ¾ “ Lock “ ...	145 50
<i>Adage.</i>	8820—“ Casting, Japanned, for 2-inch Tubing.....	88 00

For description and advantages of Lock Cones, see page 22.

Type G Insulator Caps and Cones



Cap



Cone

TYPE G Caps and Cones are made of Dirigo Insulation and are used interchangeably with the various forms of Type G Hangers listed on the preceding pages.

Code Word	No.				List per 100
<i>Adagial.</i>	5440—	Insulator Cap,	$\frac{5}{8}$ -inch Stud.....		\$31 50
<i>Adamant.</i>	5441—	" Cone, Plain, $\frac{5}{8}$ "	"		18 50
<i>Adaptly.</i>	5442—	" " Lock, $\frac{5}{8}$ "	"		23 50
<i>Adaunt.</i>	5443—	" Cap, $\frac{3}{4}$ "	"		34 00
<i>Addeem.</i>	5444—	" Cone, Plain, $\frac{3}{4}$ "	"		18 50
<i>Adder.</i>	5445—	" " Lock, $\frac{3}{4}$ "	"		23 50

For description and advantages of Lock Cones, see page 22.

Cap and Cone Hanger Wrench

For Types G and W Hangers



BY means of this Wrench the cap of any of the various forms of Type G or W Hangers can be rigidly held while the ear or clamp is screwed tightly into place.

Code Word	No.	List per 100
<i>Actor.</i>	8132—Cap and Cone Hanger Wrench.....	\$175 00

Type W Insulator Caps and Cones

Patented



Insulator Cap



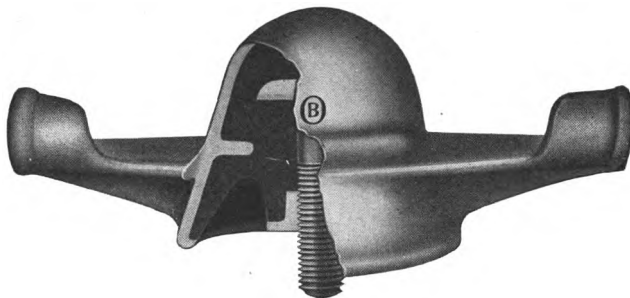
Insulator Cone

TYPE W Caps and Cones are made of Dirigo Insulation and are used interchangeably with the various forms of Type W Hangers as listed in former catalogues. They cannot be used with Type G Hangers. Owing to the marked preference of the trade for Type G Hangers the manufacture of Type W Hangers has been discontinued and the caps and cones here listed are offered for maintenance work only.

Code Word	No.				List per 100
<i>Addict.</i>	2167—	Insulator Cap,	$\frac{5}{8}$ -inch Stud.....		\$31 50
<i>Addible.</i>	2168—	" Cone, Plain, $\frac{5}{8}$	"		18 50
<i>Adduce.</i>	2114—	" " Lock, $\frac{3}{4}$	"		23 50
<i>Adept.</i>	6432—	" Cap, $\frac{3}{4}$	"		34 00
<i>Adieu.</i>	6433—	" Cone, Plain, $\frac{3}{4}$	"		18 50
<i>Adnate.</i>	6434—	" " Lock, $\frac{3}{4}$	"		23 50

For description and advantages of Lock Cones, see page 22.

Type L Straight Line Hanger



EXTRA heavy form of round top hanger, intended for the most severe service conditions. Diameter of skirt at lower edge is $3\frac{1}{2}$ inches. Body and arms are heavier than those of the Type F Hanger.

Code Word	No.	List per 100
Additive.	5491—Straight Line Hanger, Mall. Iron, Galvanized, $\frac{5}{8}$ -inch Stud..	\$108 00
Adducent.	5493— " " " " " " $\frac{3}{4}$ " ..	108 00
Adherent.	5492— " " " " Japanned, $\frac{5}{8}$ " ..	100 00
Adhesion.	5494— " " " " " " $\frac{3}{4}$ " ..	100 00

Type F Straight Line Hanger

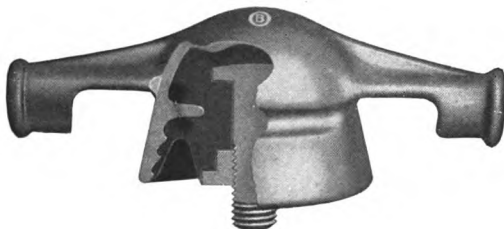


SIMILAR to Type N Hanger, except larger and heavier throughout. The shell is $3\frac{1}{2}$ inches in diameter at lower edge of skirt.

Code Word	No.	List per 100
Adhibit.	8876—Straight Line Hanger, Mall. Iron, Galvanized, $\frac{5}{8}$ -inch Stud....	\$95 00
Adipose.	8877— " " " " " " $\frac{3}{4}$ "	97 50
Adjoint.	8878— " " " " Japanned, $\frac{5}{8}$ "	90 00
Adjudger.	8879— " " " " " " $\frac{3}{4}$ "	92 50

Type N Hangers

Straight Line



IN this design the span wire is carried below the arms, while on the more common forms the span wire passes above the arms, causing the entire load to be carried by two small lugs or clips.

Dirigo Insulation is used, and the shell completely encloses it, giving protection from blows from the trolley. The stud is moulded directly into the insulation and is provided with a flanged head which, together with the ribs inside the shell, firmly anchors the parts of the hanger together.

The lower end of the stud is fitted with a circular metal washer which furnishes a bearing surface for the boss on the trolley ear or clamp and at the same time serves to reinforce the insulation. The shell is $3\frac{1}{8}$ inches in diameter at the lower edge of the metal skirt.

Code Word	No.	List per 100
<i>Adjumt.</i>	3144—Straight Line Hanger, Mall. Iron, Galvanized, $\frac{3}{8}$ -inch Stud....	\$80 00
<i>Adjutor.</i>	6554— “ “ “ “ “ “ “ “	82 50
<i>Admiral.</i>	3145— “ “ “ “ Japanned, $\frac{3}{8}$ “	75 00
<i>Admirer.</i>	6555— “ “ “ “ “ “ “ “	77 50

Type N Hangers

Barn



Height 2½ Inches

Code Word	No.	List per 100
<i>Adnation.</i>	3994—Barn Hanger, Malleable Iron, Galvanized, $\frac{5}{8}$ -inch Stud.	\$80 00
<i>Adorable.</i>	6557— " " " " " $\frac{3}{4}$ "	82 50

Swiveled Pole Bracket



Code Word	No.	List per 100
<i>Admonish.</i>	8828—Hanger, Mall. Iron, Galv., $\frac{5}{8}$ -inch Stud, for 1½-inch Tubing. . .	\$145 00

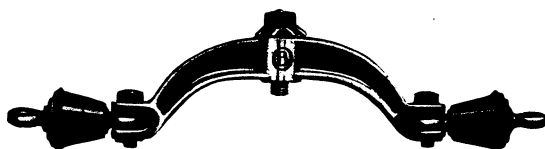
Single and Double Curve Pull-Overs

With Conical Strain Insulators

Type A—Form 1



Single Curve



Double Curve

IN this new design the spread between the arms of the yoke has been increased and the malleable iron yoke casting is heavier, having an "I" section with a flange or rib at the top and bottom of the vertical web. The distribution of the metal is such as to give a maximum strength.

Equipped with a blank bolt and cotter pin for attaching the insulator to the yoke, which makes it easy to remove the bolt, should this become necessary.

The clevis portion will accommodate any of our standard Conical and Wood Break Strain Insulators, except No. 9974.

Any of the standard sizes and styles of ears, also the Types M-W, Bulldog and Detroit Trolley Clamps, may be used with these Pull-Overs.

Code Word	No.	List per 100
<i>Adorer.</i>	10117—Single Curve Pull-Over, Galvanized, $\frac{5}{8}$ x $2\frac{1}{4}$ -inch Stud.....	\$105 00
<i>Adorn.</i>	10118— " " " " $\frac{3}{4}$ x $2\frac{1}{8}$ "	112 50
<i>Adrift.</i>	10119— " " " Japanned, $\frac{5}{8}$ x $2\frac{1}{4}$ "	101 25
<i>Adulate.</i>	10120— " " " " $\frac{3}{4}$ x $2\frac{1}{8}$ "	107 50
<i>Adulter.</i>	10121—Double " " Galvanized, $\frac{5}{8}$ x $2\frac{1}{4}$ "	181 25
<i>Advent.</i>	10122— " " " " $\frac{3}{4}$ x $2\frac{1}{8}$ "	188 75
<i>Adverb.</i>	10123— " " " Japanned, $\frac{5}{8}$ x $2\frac{1}{4}$ "	175 00
<i>Adverse.</i>	10124— " " " " $\frac{3}{4}$ x $2\frac{1}{8}$ "	181 25

Single and Double Curve Pull-Overs

With Wood Break Strain Insulators

Type A—Form 2



Single Curve



Double Curve

EXACTLY in duplicate of the Type A, Form 1, Pull-Over shown on page 31 of this catalogue with the exception that our standard Wood Break Strain Insulator, Catalogue No. 8574, is furnished in place of the Conical Strain Insulator.

These Pull-Overs can be used with any of the standard sizes and styles of ears, also with the Types M-W, Bulldog and Detroit Trolley Clamps.

Code Word	No.					List per 100
<i>Adroitly.</i>	10125—	Single Curve Pull-Over, Galvanized,	$\frac{5}{8}$ x 2 $\frac{3}{4}$ -inch Stud.....			\$ 86 25
<i>Advancer.</i>	10126—	" " " " "	$\frac{3}{4}$ x 2 $\frac{7}{8}$ " " " "			95 00
<i>Adviser.</i>	10127—	" " " " "	Japanned, $\frac{5}{8}$ x 2 $\frac{3}{4}$ " " " "			82 50
<i>Advisory.</i>	10128—	" " " " "	" $\frac{3}{4}$ x 2 $\frac{7}{8}$ " " " "			90 00
<i>Advocate.</i>	10129—	Double " " "	Galvanized, $\frac{5}{8}$ x 2 $\frac{3}{4}$ " " " "			143 75
<i>Advoke.</i>	10130—	" " " " "	" $\frac{3}{4}$ x 2 $\frac{7}{8}$ " " " "			151 25
<i>Aerator.</i>	10131—	" " " " "	Japanned, $\frac{5}{8}$ x 2 $\frac{3}{4}$ " " " "			137 50
<i>Aerial.</i>	10132—	" " " " "	" $\frac{3}{4}$ x 2 $\frac{7}{8}$ " " " "			145 00

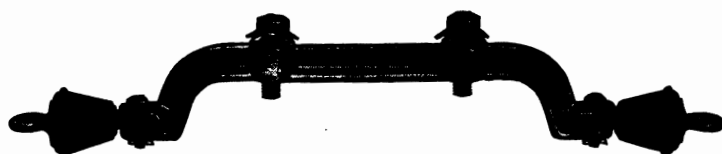
Single and Double Curve Pull-Overs

With Conical Strain Insulators

Type B—Form 1



Single Curve



Double Curve

DESIGNED to suspend two parallel trolley wires, with a separation of 6 inches between them instead of one wire only. Regularly furnished with 2-inch Conical Strain Insulators. The various standard sizes and styles of ears, also Types M-W, Bulldog and Detroit Trolley Clamps, can be used with them.

Code Word	No.					List per 100
<i>Aeronaut.</i>	4015—	Single Curve Pull-Over,	Galvanized,	$\frac{5}{8}$ x $2\frac{3}{8}$ -inch Studs.....		\$137 50
<i>Affable.</i>	6577—	"	"	"	$\frac{3}{4}$ x $2\frac{3}{8}$ "	142 50
<i>Affiance.</i>	4016—	"	"	Japanned,	$\frac{5}{8}$ x $2\frac{3}{8}$ "	130 00
<i>Affile.</i>	6578—	"	"	"	$\frac{3}{4}$ x $2\frac{3}{8}$ "	135 00
<i>Affix.</i>	4017—	Double	"	Galvanized,	$\frac{5}{8}$ x $2\frac{3}{8}$ "	225 00
<i>Afflict.</i>	6579—	"	"	"	$\frac{3}{4}$ x $2\frac{3}{8}$ "	230 00
<i>Affluent.</i>	4018—	"	"	Japanned,	$\frac{5}{8}$ x $2\frac{3}{8}$ "	212 50
<i>Affray.</i>	6580—	"	"	"	$\frac{3}{4}$ x $2\frac{3}{8}$ "	217 50

Single and Double Curve Pull-Over

With Wood Break Strain Insulators

Type B—Form 2



Single Curve



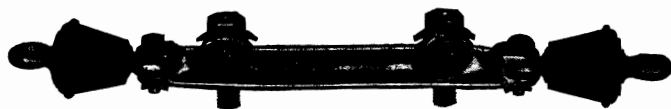
Double Curve

DESIGNED for suspending two trolley wires in parallel, with a separation of 6 inches between them. Furnished with standard Wood Break Strain Insulators, Catalogue No. 8574. The various sizes and styles of ears, also the Types M-W, Bulldog and Detroit Trolley Clamps, can be used with them.

Code Word	No.				List per 100
<i>Aflame.</i>	8888—	Single Curve Pull-Over,	Galvanized,	$\frac{5}{8}$ x $2\frac{3}{4}$ -inch Studs.....	\$120 00
<i>Afloat.</i>	8889—	"	"	" $\frac{3}{4}$ x $2\frac{3}{8}$ "	125 00
<i>Afore.</i>	8890—	"	"	Japanned, $\frac{3}{4}$ x $2\frac{3}{8}$ "	112 50
<i>Aftmost.</i>	8891—	"	"	" $\frac{3}{4}$ x $2\frac{3}{8}$ "	107 50
<i>Aggrate.</i>	8892—	Double	"	Galvanized, $\frac{5}{8}$ x $2\frac{3}{4}$ "	190 00
<i>Aghast.</i>	8893—	"	"	" $\frac{3}{4}$ x $2\frac{3}{8}$ "	195 00
<i>Agible.</i>	8894—	"	"	Japanned, $\frac{5}{8}$ x $2\frac{3}{8}$ "	177 50
<i>Agility.</i>	8895—	"	"	" $\frac{3}{4}$ x $2\frac{3}{8}$ "	182 50

Twin Straight Line Suspension

Type B—Form 1



ESPECIALLY adapted for suspending two parallel trolley wires in electrical and mechanical connection with each other from a flexible pole bracket, but used to equal advantage on span wire construction. Fitted with two Conical Strain Insulators; spacing between wires is 6 inches.

Code Word	No.		List per 100
<i>Agleam.</i>	5511—	Suspension, Mall. Iron, Galvanized, $\frac{5}{8}$ x $2\frac{3}{8}$ -inch Stud	\$225 00
<i>Aglow.</i>	5513—	" " " $\frac{3}{4}$ x $2\frac{3}{8}$ "	230 00
<i>Agnate.</i>	5512—	" " Japanned, $\frac{5}{8}$ x $2\frac{3}{8}$ "	212 50
<i>Airily.</i>	5514—	" " " $\frac{3}{4}$ x $2\frac{3}{8}$ "	217 50

Cap Nut and Stud



USED with Strain Yokes, Suspensions, Pull-Over, etc., for attaching ears or clamps to them. Cap Nut is threaded to one end of Stud and the ear or clamp to the other end. When the several parts have been assembled, one of the projecting lugs on the Cap Nut should be bent down so as to engage one of the projections on the pull-over or yoke, thus preventing the nut from unscrewing.

Code Word	No.		List per 100
<i>Agitable.</i>	8674—	$\frac{5}{8}$ -inch Cap Nut only, Galvanized	\$6 50
<i>Agitation.</i>	8908—	" " " Japanned	6 00
<i>Agnostic.</i>	8910—	" " " Galvanized	7 50
<i>Agonize.</i>	8911—	" " " Japanned	7 00
<i>Aidance.</i>	8672—	$\frac{5}{8}$ x $2\frac{3}{8}$ -inch Stud, for use with all Yokes and Pull-Overs except Type A Pull-Overs	4 00
<i>Ailment.</i>	8909—	$\frac{3}{4}$ x $2\frac{3}{8}$ -inch Stud, for use with all Yokes and Pull-Overs except Type A Pull-Overs	6 00
<i>Aimless.</i>	10447—	$\frac{5}{8}$ x $2\frac{3}{8}$ -inch Stud, for use with Type A Pull-Overs only	4 25
<i>Alacrity.</i>	10448—	$\frac{3}{4}$ x $2\frac{3}{8}$ " " " " "	6 25

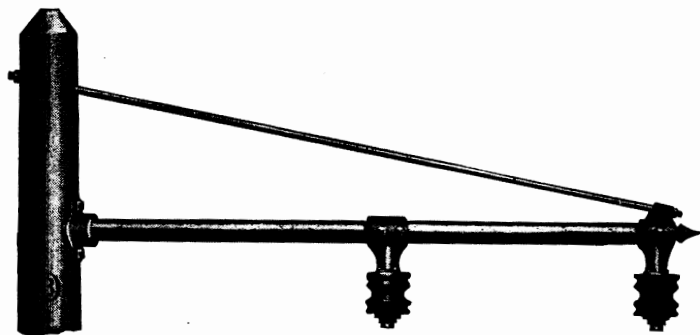
In ordering Studs care should be taken to ascertain that the Studs specified are of the proper length to fit the Pull-Overs or Yokes with which they are to be used.

Insulated Pole Bracket

Patented

Type G—For Wood Poles

1200 Volts



THE insulation is obtained by means of two Porcelain Sleeve Insulators, listed on page 37, suspended from the bracket arm by support pins. The trolley wire may be supported by either form of Suspension listed on page 39, the Suspension being attached to a steel strand running between the two Sleeve Insulators.

The bracket arm is of $1\frac{1}{2}$ -inch C tubing, the support rod is $\frac{1}{2}$ -inch and the castings are of malleable iron, japanned.

The Brackets as listed below are furnished complete, as shown in the illustration, with the exception of the Suspension Strand and also the Lag Screws for attaching to the pole.

Code Word	No.		List per 100
<i>Albeit.</i>	10388—	8-foot Bracket, $1\frac{1}{2}$ -inch C Tubing.....	\$510 00
<i>Albumen.</i>	10389— 9	" " $1\frac{1}{2}$ " "	511 00
<i>Alcohol.</i>	10390—10	" " $1\frac{1}{2}$ " "	512 00

Porcelain Sleeve Insulator

1200 Volts



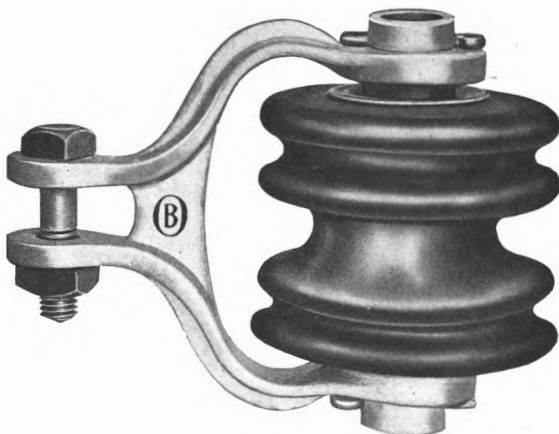
THIS Insulator is for use on Type G Pole Brackets listed on page 36, and also on the Pole Strain Insulator listed on page 38. The glaze is dark brown in color.

Working voltage	1200
Diameter of insulator	4½ inches
Height of insulator	4½ ⁵ / ₁₆ "
Diameter of hole	1½ "
Diameter of center of groove	3¼ "
Outside width of groove	1½ "

Code Word	No.	List per 100
<i>Alfalja.</i>	10391—Sleeve Insulator for 1200 Volts.....	\$62 50

Pole Strain Insulator

1200 Volts



INTENDED especially for use at the poles in 1200 volt span construction, but may be used in guy lines as it can hang in any position and still afford ample insulation.

The Porcelain Sleeve Insulator listed on page 37 is a part of this device and provides an ample factor of safety in insulation. The casting is japanned. A broken porcelain can be quickly replaced by removing the insulator pin, it being unnecessary to make up new strand joints.

In span work the clevis can be attached directly to a $\frac{3}{4}$ -inch eye bolt fastened in the pole.

Code Word
Alienage.

No.
10392—Pole Strain Insulator, Japanned Casting.....

List per 100
\$283 00

Single Straight Line Suspensions

Uninsulated

Type C—Form 1

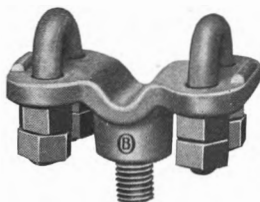


INTENDED for use on the Insulated Pole Bracket listed on page 36, and, while designed for straight line work, can be used on moderate curves.

A Wire Rope Clip should be placed on the bracket strand close to one end of the suspension to prevent slipping on severe curves.

Code Word	No.	List per 100
Alias.	10407—Type C, Form 1, Suspension, Mall. Iron, Galv., $\frac{3}{8}$ -inch Stud...	\$36 00

Type D—Form 1



INTENDED for use on the Insulated Pole Bracket listed on page 36. The "U" bolts grip the bracket strands firmly, preventing slipping, so that the device can be used on both straight line or curves.

Code Word	No.	List per 100
Alias.	10408—Type D, Form 1, Suspension, Mall. Iron, Galv., $\frac{3}{8}$ -inch Stud...	\$74 00

Type C Single Straight Line Suspensions

Double Insulation—Forms 1 and 2

1200 Volts



Form 1—With Conical Strain Insulators



Form 2—With Wood Break Strain Insulators

THIS type of Suspension affords ample insulation and mechanical strength and may be used with either Bracket or Cross-Span Construction. It consists of a strong malleable iron body casting with clevis ends and is fitted with a cap nut and stud.

The Type C, Form 1, Suspension is furnished with four 2-inch Conical Strain Insulators and the Type C, Form 2, with two 1 x 14-inch Wood Break Strain Insulators (Catalogue No. 8622).

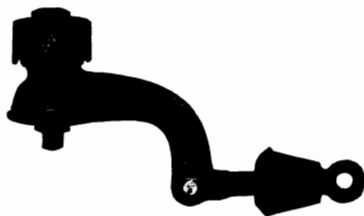
The over-all distance between eye centers of the Type C, Form 1, Suspension is 18 inches and of the Type C, Form 2, is 42 inches.

Code Word	No.	List per 100
<i>Allison.</i>	10397—Type C, Form 1, Suspension, Galvanized, $\frac{3}{8}$ -inch Stud	\$270 00
<i>Allotter.</i>	10398—“ “ “ 2, “ “ “ “ “ “ “ “	142 00

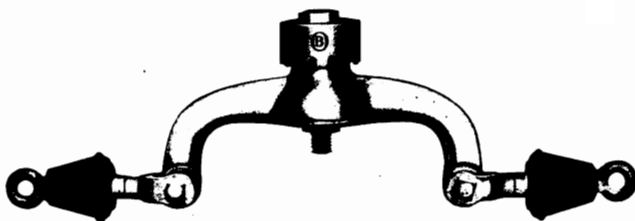
Type D Single and Double Curve Hangers

Form 2—With Conical Strain Insulators

1200 Volts



Single Curve



Double Curve

THE hanger portion is our Standard Type D Single or Double Curve Hanger equipped with 2-inch Conical Strain Insulators which afford ample auxiliary insulation.

The over-all distance from the trolley wire to the center of insulator eye on the Single Curve Hanger is $8\frac{3}{4}$ inches, while the over-all distance between eye centers on the Double Curve Hanger is $17\frac{1}{2}$ inches.

Code Word	No.	List per 100
Allow.	10399—Single Curve Hanger, Mall. Iron, Galvanized, $\frac{5}{8}$ -inch Stud.	\$180 00
Allure.	10401—Double " " " $\frac{5}{8}$ " "	270 00

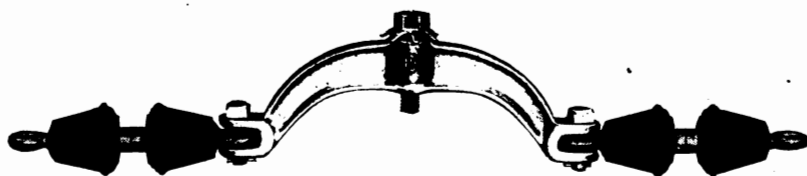
Type C Single and Double Curve Pull-Overs

Form 1—With Conical Strain Insulators

1200 Volts



Single Curve



Double Curve

THESE Pull-Overs consist of heavy malleable iron yokes to which are attached, in the single curve two, and in the double curve four, 2-inch Conical Strain Insulators, which provide ample insulation. The yoke is fitted with cap nut and stud.

The over-all distance from the trolley wire to the center of insulator eye on the Single Curve Hanger is 11 inches, while the over-all distance between eye centers of the Double Curve Hanger is 22 inches.

Code Word	No.	List per 100
<i>Almanac.</i>	10403—Single Curve Hanger, Mall. Iron, Galv., $\frac{5}{8}$ x $2\frac{1}{4}$ -inch Stud. . . .	\$165 00
<i>Almond.</i>	10405—Double " " " $\frac{5}{8}$ x $2\frac{1}{4}$ "	298 00

Type C Single and Double Curve Pull-Overs

Form 2—With Wood Break Strain Insulators

1200 Volts



Single Curve



Double Curve

CONSIST of a heavy malleable iron yoke, fitted with a cap nut and stud. Ample insulation is provided by means of 1 x 14-inch Wood Break Strain Insulators (Catalogue No. 8622), which are attached to the yoke.

The over-all distance from the trolley wire to the center of insulator eye on the Single Curve Hanger is 23 inches, while the over-all distance between eye centers of the Double Curve Hanger is 46 inches.

Code Word	No.	List per 100
<i>Amass.</i>	10404—Single Curve Hanger, Mall. Iron, Galv., $\frac{5}{8}$ x 2 $\frac{1}{4}$ -inch Stud. . . .	\$152 00
<i>Amate.</i>	10406—Double " " " $\frac{5}{8}$ x 2 $\frac{1}{4}$ "	190 00

Section Insulator

1200 Volts



USED to insulate one section of trolley wire from another and offer an unobstructed passage for the trolley wheel from section to section.

Two substantial end castings of bronze terminate in grooved ends for attachment to the trolley wire. The end castings are held together by two $1\frac{1}{4}$ -inch Wood Break Strain Insulators giving 14 inches of insulation. The $\frac{3}{8}$ -inch machine bolts which thread into the cap castings of the Wood Breaks are secured by lock washers.

The suspension and runner bars are separate pieces of selected hard wood and fit into sockets in the end castings, the latter being held in place by two cotter pins, which pass through holes drilled in the end castings.

The ends of the trolley wires are held in the grooved extensions by clamping wedges. A feeder wire connection for a No. 2-0 solid feeder wire is provided on top of each end casting.

The entire pull of the trolley wires is sustained by two Wood Break Strain Insulators, making a very strong construction. The Wood Breaks are in the same plane as the trolley wire and there is no tendency of the insulator to buckle. The clamping wedges form an exceptionally strong attachment for trolley wires, and the largest sizes of wire may be broken before slippage occurs. The wooden runner piece is easily replaced when necessary by simply removing the cotter pins.

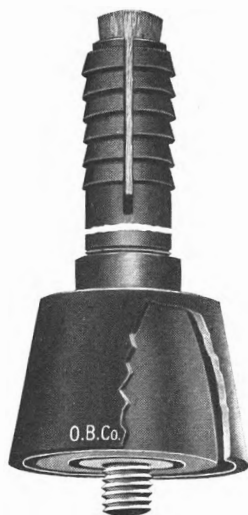
Length over all $38\frac{1}{2}$ inches; top suspension for $\frac{3}{8}$ -inch hanger stud; runner and suspension bars $1\frac{1}{2} \times 1\frac{1}{8} \times 9\frac{1}{8}$ inches.

Code Word	No.	List Each
<i>Amateurs.</i>	10409—Insulator for 0, 2-0, 3-0 & 4-0 Rd., Fig. 8 and Grooved Wires.	\$16 70
<i>Ambler.</i>	10410—Runner Piece	60

Jamme Mine Hanger

Patented

Form 1



CONSISTS of a malleable iron body casting, into which is screwed a specially constructed insulator, a space being left between the Dirigo Insulation and interior wall of shell to protect the insulation from moisture on the outer body and also making it possible to renew the insulated portion.

It is suspended directly from mine roof, thus economizing head-room, and is provided with a slotted shell fitted with a wood plug for expanding the upper end of shell as it is driven into position in a hole of proper size bored in mine roof.

The Self-Feeding Mine Drill listed on page 59 will be found very convenient for installing these hangers.

Height, top of ear boss to top of hanger casting.....	2 $\frac{1}{8}$	inches
Diameter of hanger.....	3 $\frac{1}{4}$	"
Length of expansion shell from top of hanger boss.....	5 $\frac{1}{2}$	"
Diameter of expansion shell.....	1 $\frac{1}{4}$	"

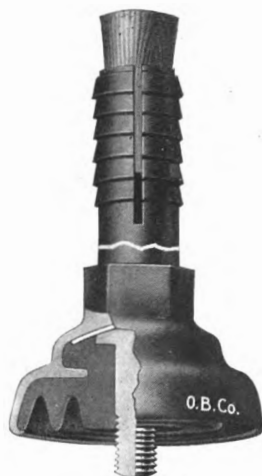
Code Word	No.	List per 100
Ambulant.	9230—Mine Hanger, Malleable Iron, Japanned, $\frac{3}{8}$ -inch Stud.....	\$112 50

Where it is desired to use a suspension longer than 5 $\frac{1}{2}$ inches we can supply to order slotted pieces of pipe cut to any desired length in place of the expansion shell.

Jamme Mine Hanger

Patented

Form 2



DIFFERS from the Jamme Hanger, Form 1, in that the stud bolt and Dirigo Insulation are moulded directly into hanger casting, and the top of the stud bolt is effectively insulated from the hanger casting by a heavy layer of mica, as shown in the illustration.

The method of attachment consists of drilling a hole of proper diameter and depth in mine roof and then driving the expansion shell with its taper plug upward, the plug striking against the bottom of the hole and forcing the sides of the shell outward, firmly wedging it in position. The Self-Feeding Mine Drill listed on page 59 will be found very convenient for installing these hangers.

Height, top of ear boss to top of hanger casting	2 $\frac{1}{4}$	inches
Diameter of hanger	3 $\frac{1}{8}$	"
Length of expansion shell from top of hanger boss	5 $\frac{1}{2}$	"
Diameter of expansion shell	1 $\frac{1}{4}$	"

Code Word	No.	List per 100
<i>Amiable.</i>	9994—Mine Hanger, Malleable Iron, Japanned, $\frac{3}{8}$ -inch Stud.....	\$112 50

Where it is desired to use a suspension longer than 5 $\frac{1}{2}$ inches we can supply to order slotted pieces of pipe cut to any desired length in place of the expansion shell.

Jamme Mine Hanger

Patented

Form 3



HAS the same excellent hanger body and insulating features possessed by the already popular Jamme, Form 2, Mine Hanger and differs from it only in the method of attachment to the mine roof and in the height.

The top of the hanger body is provided with a socket designed to take 1 1/4-inch iron pipe, which is secured in place by two set screws, as shown in illustration. The advantage of this arrangement lies in the fact that it is not necessary to thread the pipe which can be readily cut to the desired lengths to support hangers at proper distance from the mine roof.

One end of the pipe should be slotted and a wood plug inserted so as to expand the pipe in the mine roof.

This makes a very convenient method of installation, and in mines with high roofs, where the pipe is necessarily of considerable length, the large size of pipe insures a rigid support for trolley wire.

Height, top of ear boss to top of flange.....	3 5/8 inches
Diameter of hanger.....	3 5/8 "

Code Word
Amethyst.

No.

10069—Mine Hanger, Malleable Iron, Japanned, 3/8-inch Stud.....

List per 100

\$100 00

Type K Mine Hanger



THE interior construction is similar to the Type H Mine Hanger, mica being used to insulate the top of the stud bolt from the malleable iron hanger casting, and the lower surface of the Dirigo Insulation is moulded into a double petticoat which prevents tendency to surface leakage in wet mines.

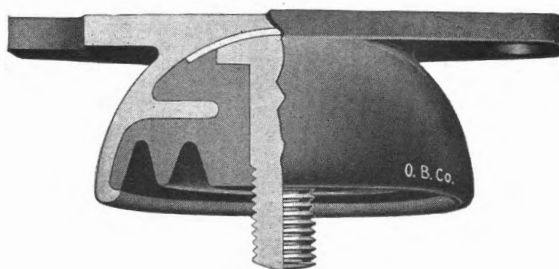
The flanged top presents a broad bearing, making the Hanger, when installed, one of the most rigid and secure on the market. This feature is especially valuable on curve work. It is a very easy and convenient Hanger to install, due to two flat surfaces under the flange, which provide ample means for the application of a wrench.

It may be attached directly to the mine roof by means of the Type A, Form 1, Expansion Bolt, listed on page 57, or the Type C, Form 1, Expansion Bolt, listed on page 56. A very convenient and economical means for attaching the Hanger directly to the mine roof is by use of the Mine Hanger Screw and Wood Plug listed on page 58. For applying to roof timbers, the Mine Hanger Screw only is necessary.

Height, top of ear boss to top of flange.....	1 $\frac{5}{8}$ inches
Diameter of hanger.....	3 $\frac{5}{8}$ "
Hole in top boss tapped for bolt.....	$\frac{3}{8}$ "

Code Word	No.	List per 100
Ambush.	9975—Mine Hanger, Malleable Iron, Japanned, $\frac{3}{8}$ -inch Stud.....	\$75 00
Amender.	9993—Hanger Wrench, " " " ".....	45 00

Type H Mine Hanger



MINIMUM height has been secured in the Type H Hanger, making it particularly adapted to mines with low roofs. The double skirt prevents surface leakage and makes the hanger particularly suitable for wet mines.

An outer shell of malleable iron contains the stud bolt and Dirigo insulating compound, which are moulded into the shell under hydraulic pressure. The stud is threaded at the lower end to engage the threaded boss of the trolley ear or clamp, the upper end being headed to secure a firm hold in the insulation. The top of the stud bolt is very effectively insulated from the inside of the hanger casting by a heavy layer of mica, which is clearly shown in the illustration. The hanger shell is provided on the inner surface with a circular flange and also with a lip at the lower edge of the skirt, which secure the insulation in the shell. Two horizontal lugs extend out from the top of the shell for attaching the Hanger to roof timbers with $\frac{1}{2}$ -inch lag screws.

Height, top of ear boss to top of hanger shell.....	1 $\frac{5}{8}$ inches
Diameter of hanger.....	3 $\frac{5}{8}$ "
" " hole and slot in lugs.....	1 $\frac{9}{16}$ "

Code Word
Amplify.

No.
9959—Mine Hanger, Malleable Iron, Japanned, $\frac{1}{2}$ -inch Stud.....

List per 100
\$90 00

Standard Mine Hanger



THIS Hanger is especially designed and constructed so as to meet the requirements for a durable and efficient trolley wire hanger for use in mines. It consists of a malleable iron shell into which is screwed a specially constructed insulator, a space being provided between the insulation and the interior surface of the hanger shell. The iron shell serves for protecting the insulation from blows from the trolley wheel and from moisture dripping from the mine roof. A space between the hanger shell and the insulation prevents the deposit of a conducting layer across the face of the insulator from the iron shell to the stud bolt, thus doing away with trouble often arising from surface leakage of current. It is intended to be attached to the roof timbers by means of lag screws, but in the absence of such timbers, the Suspension Bolt shown on page 58 can be used for this purpose.

The Self-Feeding Mine Drill listed on page 59 will be found an extremely useful device in the installation of these hangers when suspension bolts are used.

Height, top of ear boss to top of hanger shell.....	2½ inches
Diameter of hanger.....	3¼ "

Code Word	No.	List per 100
Amputate.	1080—Mine Hanger, Malleable Iron, Japanned, ½-inch Stud	\$90 00

Type B Mine Hanger



THE Dirigo Insulation is moulded directly into hanger casting with the stud bolt in place. The upper end of the stud bolt is provided with a flanged head which, together with the inner ribs of the body casting, serves to secure the parts of the Hanger firmly together. It is intended to be attached directly to the roof of the mine by means of an expansion bolt. The Type A, Form 2, Expansion Bolt listed on page 57, or Mine Hanger Screw and Plug listed on page 58, will serve for this purpose.

The Self-Feeding Mine Drill listed on page 59 will be found an extremely useful device in the installation of these hangers.

Height, top of ear boss to top of hanger boss.....	3 inches
Diameter of hanger.....	3 "

Code Word
Amusable.

No.

5784—Mine Hanger, Malleable Iron, Japanned, $\frac{3}{8}$ -inch Stud.....

List per 100

\$75 00

Type G Mine Hanger



THIS Hanger is arranged to be attached directly to the roof of the mine, no intervening timbers being required for its support. It consists of a heavy malleable iron body casting which is fitted with a Type G Insulator Cap and Cone. For detailed description of Cap and Cone see pages 22 and 26.

The Type A, Form 1, Expansion Bolt, listed on page 57, or the Type C, Form 1, Expansion Bolt, listed on page 56, may be used for attaching this Hanger direct to mine roof.

The Self-Feeding Mine Drill listed on page 59 will be found an extremely useful device in installing these hangers.

Height, top of ear boss to top of hanger casting.....	4 $\frac{1}{4}$ inches
Largest diameter of hanger.....	5 "
Diameter of insulating cap.....	3 $\frac{1}{2}$ "

Code Word	No.	List per 100
<i>Analogue.</i>	5777—Mine Hanger, Mall. Iron, Jap., $\frac{5}{8}$ -inch Stud, Plain Cone.....	\$100 00
<i>Analogy.</i>	5778— " " " " " Lock "	105 00
For description and advantages of Lock Cone, see page 22.		

Type N Mine Hanger



THE insulation and stud being moulded directly into the hanger body produces a Hanger which is very efficient, both mechanically and electrically, and especially adapted for use on curves. The threaded stud is of forged steel.

It can be attached directly to mine roof by means of the Suspension Bolt listed on page 58, or to timbers by means of lag screws.

Height, top of ear boss to top of hanger casting.....	2 $\frac{1}{4}$ inches
Diameter of hanger.....	3 $\frac{1}{8}$ "
Diameter of hole and slot in lugs.....	$\frac{1}{16}$ "

Code Word	No.	List per 100
Anadem.	8275—Mine Hanger, Malleable Iron, Japanned, $\frac{1}{8}$ -inch Stud.....	\$75 00

Type C Expansion Bolt

Forms 1 and 2



TO install the Bolt a 1 $\frac{1}{4}$ -inch hole is drilled in the mine roof. The half of the shell engaging with the stud is inserted into the hole together with the stud, and the other half of the shell driven up into place, causing the bolt to firmly grip the sides of the hole. The hanger may then be attached to the stud, which is threaded $\frac{1}{8}$ -inch standard.

Code Word	No.	List per 100
Camerate	9540—Form 1, Expansion Bolt, for Type K Hanger.....	\$30 00
Camper	10458— " 2, " " " with Nut for Type G Hanger..	32 50

Type A Expansion Bolts

Form 1



CONSISTS of a malleable iron shell, $1\frac{1}{4}$ inches in diameter, fitted with an internal stud bolt and cone-shaped nut, which expands shell and draws hanger up tightly against roof. Used with Type G Mine Hanger.

Code Word	No.	List per 100
Anarch.	5773—Form 1 Expansion Bolt, length of Shell 4 inches, $\frac{5}{8}$ -inch Stud	\$33 75
Anatine.	5774— " 1 " " " " 6 " $\frac{5}{8}$ "	38 75

Form 2



PROVIDED with hex on stud so it can be expanded before hanger is attached. Large washer gives good bearing surface against roof. Used with Type B Mine Hanger.

Code Word	No.	List per 100
Anatomy.	5775—Form 2 Expansion Bolt, length of Shell 4 inches, $\frac{5}{8}$ -inch Stud	\$43 75
Ancestor.	5776— " 2 " " " " 6 " $\frac{5}{8}$ "	46 90

Form 3



Used with Type K Mine Hanger.

Code Word	No.	List per 100
Aneroid.	10072—Form 3 Expansion Bolt, 4-inch Shell, $\frac{5}{8}$ -inch Stud.....	\$25 00
Ancient.	10073— " 3 " " " 6 " $\frac{5}{8}$ "	31 25

Suspension Bolt



USED with mine hangers, such as the Standard and Type N, when necessary to attach directly to roof of mine. The length is 6 inches, diameter $\frac{3}{4}$ inch, and lower end is threaded $\frac{1}{2}$ inch. This Bolt is in two pieces, and the method of attaching consists of drilling a hole of the proper size and inserting the toothed portion; the other portion, which is smooth, is then started in the hole and driven in so as to force the teeth to firmly engage the side of the hole.

Code Word	No.	List per 100
<i>Anent.</i>	2649—Suspension Bolt.....	\$17 50

Mine Hanger Screw and Wood Plug



No. 8771

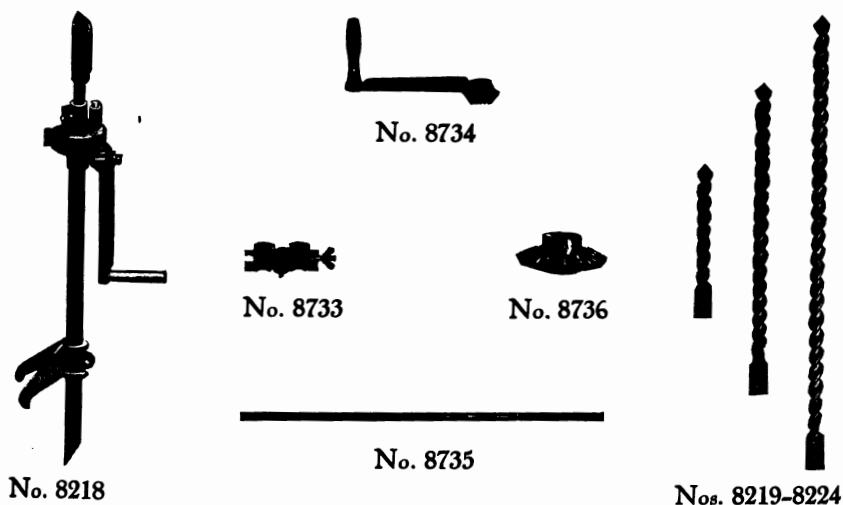


No. 8770

A CONVENIENT and economical means for attaching mine hangers directly to mine roof. A hole is drilled in the roof of such a size that the Wood Plug will make a driving fit. The Hanger Screw is then attached to the mine hanger to be installed, and is screwed into the Wood Plug by means of a wrench applied to the hexagonal portion of the hanger, thereby expanding the Wood Plug. When the hanger is to be attached to roof timbers the Mine Hanger Screw only is necessary. It may be used with the Type B or Type K Mine Hangers.

Code Word	No.	List per 100
<i>Animate.</i>	8770—Wood Plug, $1\frac{1}{2} \times 3$ inches.....	\$12 50
<i>Annoint.</i>	8771—Lag Screw Support, $\frac{3}{8} \times 4$ inches.....	8 00

Self-Feeding Mine Drill



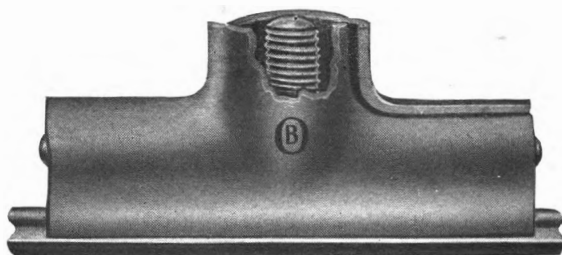
DESIGNED especially for drilling holes in mine roofs and walls, for installing hangers, as well as for blasting purposes, etc. The Drill is so arranged that it can be anchored at the lower end either against the ground or a projecting ledge in the wall, or both, as desired, by properly adjusting the movable brace on the pipe standard. The auger is operated by means of a crank, which feeds the Drill automatically. The Drill can be quickly set up or removed by loosening the clamping piece bearing against the feed screw, allowing the screw to drop back in the pipe standard. Perfect lubrication can be assured by keeping the pipe standard filled with oil.

Code Word	No.	List Each
<i>Annuary.</i>	8218—Self-Feeding Mine Drill.....	\$37 50
<i>Antedate.</i>	8733—Split Bronze Feed Nut	9 20
<i>Antelope.</i>	8734—Handle Gear, 18 Teeth.....	2 30
<i>Anthem.</i>	8735—Threaded Feed Shaft, 1 x 41½ inches, 14 Threads per inch....	10 00
<i>Antic.</i>	8736—Feed Shaft Gear, 28 Teeth, complete	3 30
<i>Antimony.</i>	8219—Auger Bits, 1½ inches in diameter, 12 inches long.....	2 75
<i>Antique.</i>	8220— " " 1½ " " 12 " "	2 95
<i>Antler.</i>	8221— " " 1½ " " 24 " "	4 30
<i>Apace.</i>	8222— " " 1½ " " 24 " "	4 65
<i>Apathy.</i>	8223— " " 1½ " " 36 " "	5 50
<i>Apical.</i>	8224— " " 1½ " " 36 " "	6 25

Type D-W Trolley Clamp

Patented

For Round, Figure 8 and Grooved Wires



THIS Clamp is listed for maintenance work only, the M-W or Bulldog Clamps being recommended for all new construction.

Consists of two interlocking jaws which are hinged on a steel pin. This pin passes through the lower end of the stud bolt, securing the latter in place and preventing it from turning.

It is operated by means of a D-W Bolt listed on page 18, the cone-shaped end of the bolt forcing the jaws tightly upon the wire as the bolt is threaded upon the stud of the clamp.

The standard threading for both D-W Clamps and Bolts is left-hand and it is important to mention threading desired when ordering.

Code Word	No.	List per 100
<i>Apostate.</i>	10416—Clamp, Bronze, for 0 and 2-0 Round Wire.....	\$62 50
<i>Appalled.</i>	10417— “ “ 3-0 “ 4-0 “ “	62 50
<i>Apparel.</i>	10418— “ “ 0, 2-0, 3-0 and 4-0 Fig. 8 Wire.....	62 50
<i>Appease.</i>	10419— “ “ 2-0, 3-0 and 4-0 Grooved Wire	62 50
<i>Appetent.</i>	10420— “ Mall. Iron, Galv., for 0, 2-0, 3-0 and 4-0 Fig. 8 Wire	32 50
<i>Applaud.</i>	10421— “ “ 2-0, 3-0 and 4-0 Grooved “	32 50

Always specify whether left or right-hand threads are desired, otherwise Clamps with left-hand threading will be supplied. See page 18 for listing of D-W Bolts for use with above Clamps.

Type M-W Trolley Clamp

Patented

For Round, Figure 8 and Grooved Wires



CONSISTS of two interlocking jaws which are hinged on a steel pin. This pin passes through the lower end of stud bolt, securing the latter in place and preventing it from turning.

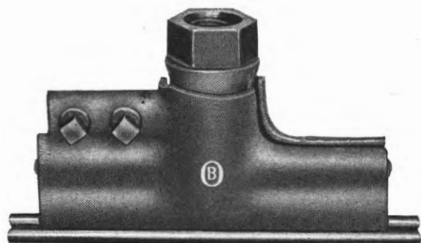
It is provided with a special nut, cone-shaped on one end to correspond to a recess on the top of the Clamp, and hexagonal on other end so that the Type D Wrench may be used on it. The stud bolt in the Clamp has a left-hand thread, while the thread on the hexagonal end of the nut is right-hand, thus allowing the Clamp to be either loosened or tightened on the wire by simply turning the nut in the proper direction. It may be used with any hanger having a $\frac{5}{8}$ -inch stud.

Code Word	No.	List per 100
<i>Apposer.</i>	10422—Clamp, Bronze, for 0 and 2-0 Round Wire.....	\$62 50
<i>Apprizer</i>	10423— " " 3-0 " 4-0 " "	62 50
<i>Apricot.</i>	10424— " " 0, 2-0, 3-0 and 4-0 Fig. 8 Wire.....	62 50
<i>Aproned.</i>	10425— " " 2-0, 3-0 and 4-0 Grooved Wire.....	62 50
<i>Aptate.</i>	10426— " Mall. Iron, Galv., for 0, 2-0, 3-0 and 4-0 Fig. 8 Wire	32 50
<i>Aptness.</i>	10427— " " " 2-0, 3-0 and 4-0 Grooved "	32 50

Type M-W Feeder Clamps

Patented

For Round, Figure 8 and Grooved Wires



FEEDER lug will accommodate a No. 2-0 B & S gauge, solid wire. May be used with any hanger having a $\frac{3}{8}$ -inch stud.

Code Word	No.	List per 100
<i>Aquarium.</i>	10428—Feeder Clamp, Bronze, for 0 and 2-0 Round Wire.....	\$75 00
<i>Aqueduct.</i>	10429— “ “ “ 3-0 “ 4-0 “ “	75 00
<i>Arbiter.</i>	10430— “ “ “ 0, 2-0, 3-0 and 4-0 Fig. 8 Wire.	75 00
<i>Arborist.</i>	10431— “ “ “ 2-0, 3-0 and 4-0 Grooved Wire....	75 00

Bulldog Wrench



USED for installing Bulldog Clamps. One of these wrenches is included, free of charge, with every order for Bulldog Clamps. Extra wrenches as below.

Code Word	No.	List per 100
<i>Arbor.</i>	10349—Wrench for Bulldog Clamps.....	\$37 50

See page 63 for Bulldog Clamps.

Bulldog Trolley Clamps

For Round, Figure 8 and Grooved Wires



CONSISTS of two substantial malleable iron jaws with their open portions interlocking and held together by a high strength steel rivet, upon which the jaws have a hinge action, clamping upon the wire by means of a yoke casting which is forced down upon them by a hex nut threaded on the outside of the jaws.

Height over all $2\frac{1}{2}$ inches; length $3\frac{1}{4}$ inches.

Code Word	No.	List per 100
<i>Arduous.</i>	10344—Clamp, Malleable Iron, Galvanized, Bronze Jaws, $\frac{3}{8}$ -inch Boss, for 0 and 2-0 Round Wire	\$62 50
<i>Argosy.</i>	10345—Clamp, Malleable Iron, Galvanized, Bronze Jaws, $\frac{3}{8}$ -inch Boss, for 3-0 and 4-0 Round Wire	65 00
<i>Arcades.</i>	10340—Clamp, Malleable Iron, Galvanized, $\frac{3}{8}$ -inch Boss, for 0 to 4-0 Fig. 8 and Grooved Wire	47 50

Bulldog Feeder Clamps



Feeder lug will accommodate a No. 2-0 solid feeder wire.

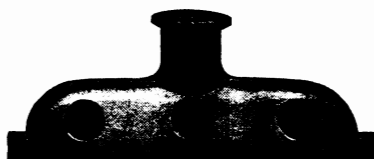
Code Word	No.	List per 100
<i>Aridity.</i>	10347—Feeder Clamp, Bronze, $\frac{3}{8}$ -inch Boss, for 0 and 2-0 Round Wire	\$100 00
<i>Armament.</i>	10348—“ “ “ “ “ “ 3-0 “ 4-0 “ “	105 00
<i>Arguer.</i>	10346—“ “ “ “ “ “ 0 to 4-0 Fig. 8 and Grooved Wires	100 00

See page 62 for Bulldog Wrench.

Detroit Trolley Clamps

For Round, Figure 8 and Grooved Wires

Forms 1 and 2



WILL meet all ordinary requirements for straight line suspension, but the several styles shown on the succeeding pages are recommended where heavier or stronger clamps are desired.

Form 1—For $\frac{5}{8}$ -inch Stud Bolt—Length 4 Inches

Code Word	No.	List per 100
Armory.	8912—Clamp, Bronze, for 0 Round Wire.....	\$62 50
Arnica.	8913— “ “ “ 2-0 “ “	62 50
Aroma.	8914— “ “ “ 3-0 “ “	62 50
Array.	8915— “ “ “ 4-0 “ “	62 50
Arrear.	8917— “ Mall. Iron, Galv., for 0 and 2-0 Fig. 8 Wire.....	32 50
Artery.	8920— “ “ “ “ 3-0 “ 4-0 “ 8 “	32 50
Artful.	8922— “ Bronze, for 2-0, 3-0 and 4-0 Grooved Wire.....	62 50
Arsenal.	8923— “ Mall. Iron, Galv., for 2-0, 3-0 and 4-0 Grooved Wire.	32 50

Form 2—For $\frac{5}{8}$ -inch Stud Bolt—Length 5 inches

Arrosion.	8935—Clamp, Bronze, for 2-0, 3-0 and 4-0 Grooved Wire.....	\$62 50
Arterial.	8936— “ Mall. Iron, Galv., for 2-0, 3-0 and 4-0 Grooved Wire..	32 50
Arsenal.	8937— “ “ Jap., “ 2-0, 3-0 “ 4-0 “ “ ..	30 00

Detroit Trolley Clamps

For Round, Figure 8 and Grooved Wires

Form 3



INTENDED for use where the weight or strain is greater than the Forms 1 and 2 Clamps will safely carry and is recommended only for straight line suspension or for very moderate curved construction. Length 8 inches.

For $\frac{5}{8}$ -inch Stud Bolt

Code Word	No.		List per 100
<i>Airward.</i>	8938—	Clamp, Bronze, for 0 Round Wire.....	\$85 00
<i>Akimbo.</i>	8939—	" " " 2-0 " "	85 00
<i>Alarmed.</i>	8940—	" " " 3-0 " "	85 00
<i>Alation.</i>	8941—	" " " 4-0 " "	85 00
<i>Artisan.</i>	8943—	" Mall. Iron, Galv., for 0 and 2-0 Fig. 8 Wire	37 50
<i>Ascetic.</i>	8946—	" " " 3-0 " 4-0 " 8 "	37 50
<i>Ashame.</i>	8948—	" Bronze, for 2-0, 3-0, 4-0 Grooved Wire.....	85 00
<i>Ashen.</i>	8949—	" Mall. Iron, Galv., for 2-0, 3-0, 4-0 Grooved Wire.....	37 50

For $\frac{3}{4}$ -inch Stud Bolt

<i>Ashore.</i>	8956—	Clamp, Mall. Iron, Galv., for 0 and 2-0 Fig. 8 Wire.....	\$37 50
<i>Askew.</i>	8959—	" " " 3-0 " 4-0 " 8 "	37 50
<i>Asonant.</i>	8970—	" Bronze, for 2-0, 3-0, 4-0 Grooved Wire	85 00
<i>Asperate.</i>	8971—	" Mall. Iron, Galv., for 2-0, 3-0, 4-0 Grooved Wire	37 50

Detroit Trolley Clamps

For Grooved Wire

Form 4



INTENDED especially for supporting the trolley wire on curves where, on account of the severe side strains placed on the wire, a clamp of extra length is required. It also makes an excellent clamp for straight line suspension. The end jaws are $2\frac{1}{2}$ inches long, and over-all length is 10 inches.

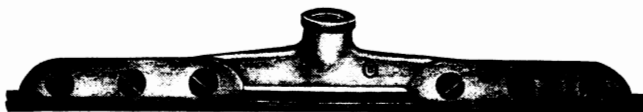
For $\frac{5}{8}$ -inch Stud Bolt

Code Word	No.	List per 100
<i>Aspirant.</i>	8973—Clamp, Mall. Iron, Galv., for 2-0, 3-0, 4-0 Grooved Wire . . .	\$45 00

For $\frac{3}{4}$ -inch Stud Bolt

<i>Aspired.</i>	8975—Clamp, Mall. Iron, Galv., for 2-0, 3-0, 4-0 Grooved Wire . . .	\$45 00
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Form 5



IS longer and correspondingly heavier throughout than the Form 4 Clamp. The over-all length is 14 inches and the end jaws are 5 inches long.

For $\frac{5}{8}$ -inch Stud Bolt

Code Word	No.	List per 100
<i>Assail.</i>	8977—Clamp, Mall. Iron, Galv., for 2-0, 3-0, 4-0 Grooved Wire . . .	\$62 50

For $\frac{3}{4}$ -inch Stud Bolt

<i>Assailer.</i>	8979—Clamp, Mall. Iron, Galv., for 2-0, 3-0, 4-0 Grooved Wire . . .	\$62 50
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Detroit Double Strain Clamp

Form 3



IS a decided improvement over old design. Length has been increased to 12 inches and screws set closer together.

Code Word	No.	List per 100
<i>Assigner.</i>	10368—Clamp, Bronze, $\frac{3}{8}$ -inch Boss, for 2-0, 3-0 and 4-0 G'v'd Wire	\$184 00
<i>Assumpt.</i>	10369— " " " " 2-0, 3-0 " 4-0	184 00
<i>Asterisk.</i>	10370— " Malleable Iron, Galvanized, $\frac{3}{8}$ -inch Boss, for 2-0, 3-0 and 4-0 Grooved Wire	92 00
<i>Atound.</i>	10371—Clamp, Malleable Iron, Galvanized, $\frac{3}{8}$ -inch Boss, for 2-0, 3-0 and 4-0 Grooved Wire	92 00

Detroit Anchor Clamp



Intended for use where the strain is not excessive. Length 8 inches.

Code Word	No.	List per 100
<i>Atomist.</i>	8965—Anchor Clamp, for 0 and 2-0 Fig. 8 Wire	\$115 00
<i>Atomize.</i>	8966— " " 3-0 " 4-0 " 8	115 00
<i>Atoner.</i>	8967— " " 2-0, 3-0 and 4-0 Grooved Wire	115 00

Detroit Feeder Clamp



LENGTH 8 inches. Provided with feeder lug which will take a No. 2-0 solid wire. Lips tinned for soldering if desired.

Code Word	No.	List per 100
<i>Astral.</i>	8992—Clamp, Bronze, $\frac{3}{8}$ -inch Boss, for 0 Round Wire	\$105 00
<i>Astride.</i>	8993— " " " " 2-0 " " "	105 00
<i>Asunder.</i>	8994— " " " " 3-0 " " "	105 00
<i>Asylum.</i>	8995— " " " " 4-0 " " "	105 00
<i>Atheist.</i>	8996— " " " " 0 and 2-0 Fig. 8 Wire	105 00
<i>Athlete.</i>	8997— " " " " 3-0 " 4-0 " 8	105 00
<i>Aспен.</i>	8998— " " " " 2-0, 3-0 and 4-0 G'v'd Wire	105 00
<i>Aster.</i>	9042— " " " " 2-0, 3-0 " 4-0	105 00

Clinch Trolley Ear

For Round Wire



HAS a heavy web which extends to top of boss and the boss extends entirely down to the lips. Groove has ample depth to allow lips to be formed around trolley wire, so as to properly support it and still not offer any obstruction to trolley wheel. Can be furnished tinned for soldering if desired.

Length 9 Inches

Code Word	No.			List per 100
<i>Atoll.</i>	10019—	Ear for	0 Round Wire, $\frac{5}{8}$ -inch Boss	\$37 00
<i>Attune.</i>	10020—	"	2-0 " " " "	37 00

Length 12 Inches

<i>Atwain.</i>	10021—	Ear for	0 Round Wire, $\frac{5}{8}$ -inch Boss	\$52 50
<i>Auburn.</i>	10022—	"	2-0 " " " "	52 50

Length 15 Inches

<i>Audacity.</i>	10023—	Ear for	0 Round Wire, $\frac{5}{8}$ -inch Boss	\$55 00
<i>Audible.</i>	10024—	"	2-0 " " " "	55 00
<i>Audition.</i>	10025—	"	2-0 " " " "	55 00
<i>Augment.</i>	10026—	"	3-0 " " " "	77 00
<i>Augury.</i>	10027—	"	3-0 " " " "	77 00
<i>Aurated.</i>	10028—	"	4-0 " " " "	77 00
<i>Aureole.</i>	10029—	"	4-0 " " " "	77 00

Clinch Feeder Ear

For Round Wire



FEEDER lug, drilled to accommodate a No. 2-0 B. & S. solid wire. Length of ear 15 inches; groove is tinned for soldering.

Code Word	No.				List per 100
<i>Auric.</i>	10061—	Feeder Ear for	0 Round Wire, $\frac{5}{8}$ -inch Boss		\$ 77 50
<i>Auricle.</i>	10063—	"	2-0 " " " "		77 50
<i>Aurist.</i>	10064—	"	2-0 " " " "		77 50
<i>Aurora.</i>	10065—	"	3-0 " " " "		105 00
<i>Auspice.</i>	10066—	"	3-0 " " " "		105 00
<i>Austere.</i>	10067—	"	4-0 " " " "		105 00
<i>Authors.</i>	10068—	"	4-0 " " " "		105 00

Ears with two Feeder Lugs, one at each end, furnished to order.

Semi-Clinch Trolley Ear

For Round Wire



LIPS encompass slightly more than one-half the circumference of trolley wire. Can only be used by soldering. Edges of lips are ground thin so as to offer little obstruction to trolley wheel, and groove tinned for soldering.

Length 12 Inches

Code Word	No.	Length 12 inches	List per 100
<i>Autocrat.</i>	6657	—Ear for 2-0 Round Wire, $\frac{1}{4}$ -inch Boss.....	\$52 50

Length 15 Inches

<i>Autopsy.</i>	6663—	Ear for	0	Round Wire,	$\frac{5}{8}$ -inch	Boss.....	\$55	00
<i>Autotype</i>	6665—	"	2-0	"	"	".....	55	00

Type A Trolley Ear

For Round Wire



LIPS nearly encircle the wire, hence soldering can be dispensed with. Ears are regularly furnished not tinned, but can be tinned if desired. Ends are reinforced on top so as to give added strength, and distance from bottom of Ear to top of boss is $1\frac{1}{8}$ inches.

Length 12 Inches

	No.	Length	List per 100
Code Word		12 inches	
Avarice.	5753—Ear for 0 Round Wire, $\frac{5}{8}$ -inch Boss.....		\$52 50
Avast.	5755—" 2-0 " " " "		52 50

Length 15 Inches

<i>Avant.</i>	5754—	Ear for	0	Round Wire,	inch Boss.....	\$55 00
<i>Averment.</i>	5756—	"	2-0	"	" " ".....	55 00
<i>Aversed.</i>	5758—	"	3-0	"	" " ".....	77 00
<i>Aversion.</i>	5760—	"	4-0	"	" " ".....	77 00
<i>Avoider.</i>	8964—	"	4-0	"	" " ".....	77 00

Walker Trolley Ear

Patented

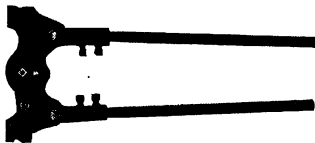
For Round Wire



DESIGNED for both straight line and curve suspension, and affords a support for a trolley wire that minimizes the tendency of trolley wheel to spark when passing under it, as the lower surface of the Ear and the trolley wire are on the same plane, and of the same length, making a perfectly straight under-running surface. The trolley wire is bent to the proper curvature to conform to shape of Ear by a special tool, which makes it a quick and easy operation to place ear in position on line. If necessary to change position of hanger on line, the center and end lugs of ear can be bent back sufficiently to allow the trolley wire to be removed and straightened for replacing. It is an excellent support for trolley wire on curves, as it affords a solid wall of metal on one side against which trolley wire can rest. Length $8\frac{1}{4}$ inches.

Code Word	No.		List per 100
<i>Avise.</i>	6679—	Ear for 0 Round Wire, $\frac{5}{8}$ -inch Boss.....	\$42 50
<i>Avoke.</i>	6681—	" 2-0 " " $\frac{5}{8}$ "	42 50
<i>Avolate.</i>	6683—	" 3-0 " " $\frac{5}{8}$ "	50 00
<i>Avowals.</i>	6685—	" 4-0 " " $\frac{5}{8}$ "	50 00

Walker Forming Tool



Used for shaping trolley wire to conform to Walker Ear.

Code Word	No.	List per 100
<i>Avulsion.</i>	1108—	Forming Tool for Walker Ear.....\$275 00

Soldered and Clinch Trolley Ears

For Figure 8 Wire



LIPS are so shaped that when hammered into position around wire they fit it very closely. In the Soldered Ear the groove is tinned for soldering, and there are two holes drilled through the web of the ear into the groove, providing an easy means of pouring melted solder down upon the wire. Groove in Clinch Ear is not tinned. Length 10 inches.

Soldered Ears

Code Word	No.	List per 100
<i>Babbled.</i>	6695—Soldered Ear for 2-0 Fig. 8 Wire, $\frac{5}{8}$ -inch Boss.....	\$52 50
<i>Baboons.</i>	6697— “ “ 3-0 “ 8 “ $\frac{5}{8}$ “	67 50
<i>Baccated.</i>	6699— “ “ 4-0 “ 8 “ $\frac{5}{8}$ “	67 50

Clinch Ears

<i>Bachelor.</i>	2351—Clinch Ear for 2-0 Fig. 8 Wire, $\frac{5}{8}$ -inch Boss.....	\$52 50
<i>Bachelry.</i>	2353— “ “ 3-0 “ 8 “ $\frac{5}{8}$ “	67 50
<i>Bacillus.</i>	2355— “ “ 4-0 “ 8 “ $\frac{5}{8}$ “	67 50

Soldered Feeder Ear

For Figure 8 Wire



SIMILAR to Soldered Trolley Ear described above with addition of feeder lug drilled for No. 2-0 B. & S. gauge solid wire. Length 10 inches.

Code Word	No.	List per 100
<i>Backbone.</i>	4059—Feeder Ear for 2-0 Fig. 8 Wire, $\frac{5}{8}$ -inch Boss	\$ 77 50
<i>Backed.</i>	4060— “ “ 3-0 “ 8 “ $\frac{5}{8}$ “	105 00
<i>Backhand.</i>	4061— “ “ 4-0 “ 8 “ $\frac{5}{8}$ “	105 00

Soldered and Clinch Trolley Ears

For Grooved Wire



A DECIDED improvement over old design. Both web and boss are made heavier, length increased, and lips conform closely to shape of wire. In the Soldered Ears the lips are tinned and two holes drilled in web provide means of pouring solder in upon wire. Groove of Clinch Ear is not tinned.

Soldered Ears

Code Word	No.							List per 100
<i>Backward.</i>	10350—	Soldered Ear for 2-0 Grooved Wire,	3-in. Boss, length	12-in.	\$63	00		
<i>Bacons.</i>	10351—	" " 3-0 " " " "	"	"	15	"	81	00
<i>Bacteria.</i>	10352—	" " 3-0 " " " "	"	"	15	"	81	00
<i>Baculine.</i>	10353—	" " 4-0 " " " "	"	"	15	"	81	00
<i>Baddish.</i>	10354—	" " 4-0 " " " "	"	"	15	"	81	00

Clinch Ears

<i>Badgerer.</i>	10355—	Clinch Ear for 2-0 Grooved Wire,	3-in. Boss, length	12 inches	\$63	00		
<i>Badinage.</i>	10356—	" " 3-0 " " " "	"	"	15	"	81	00
<i>Badness.</i>	10357—	" " 3-0 " " " "	"	"	15	"	81	00
<i>Baffler.</i>	10358—	" " 4-0 " " " "	"	"	15	"	81	00
<i>Baffling.</i>	10359—	" " 4-0 " " " "	"	"	15	"	81	00

Soldered Feeder Ear

For Grooved Wire



SAME design as Soldered Ear described above, with addition of feeder lug drilled for No. 2-0 B. & S. gauge solid feeder wire.

Code Word	No.							List per 100
<i>Baggager.</i>	10373—	Feeder Ear for 2-0 Grooved Wire,	3-in. Boss, length	12 inches	\$	89	00	
<i>Bagging.</i>	10374—	" " 3-0 " " " "	"	"	15	"	118	50
<i>Bagnet.</i>	10375—	" " 3-0 " " " "	"	"	15	"	118	50
<i>Bagpipe.</i>	10376—	" " 4-0 " " " "	"	"	15	"	118	50
<i>Bailable.</i>	10377—	" " 4-0 " " " "	"	"	15	"	118	50

Soldered Double Strain Ear

For Grooved and Figure 8 Wires



A DECIDED improvement over old design. Both web and boss are made heavier and lips conform closely to shape of trolley wire. Lips are tinned for soldering and two holes drilled in web provide means of pouring solder in upon wire. Strain lugs, with holes $\frac{3}{8}$ inch in diameter, serve for attaching guy wires.

A special bronze of high tensile strength is used. Length 15 inches.

Code Word	No.							List per 100
<i>Bailee.</i>	4067—	Strain Ear for 2-0 B. & S. Grooved Wire,					$\frac{3}{8}$ -inch Boss	\$ 85 00
<i>Bailiff.</i>	4068—	" " 3-0 " " " "	"	"	"	"	"	110 00
<i>Bailment.</i>	6782—	" " 3-0 " " " "	"	"	"	"	"	110 00
<i>Bailer.</i>	4069—	" " 4-0 " " " "	"	"	"	"	"	110 00
<i>Baize.</i>	6783—	" " 4-0 " " " "	"	"	"	"	"	110 00
<i>Bakers.</i>	6800—	" " 2-0 " Fig. 8 " " "	"	"	"	"	"	85 00
<i>Bakingly.</i>	6802—	" " 3-0 " " 8 " " "	"	"	"	"	"	110 00
<i>Balanite.</i>	6804—	" " 4-0 " " 8 " " "	"	"	"	"	"	110 00

Clinch Double Strain Ear

For Round Wire

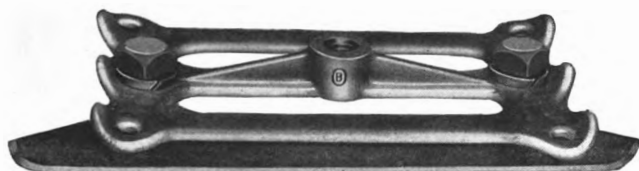


SIMILAR to Soldered Ear listed above, except no holes for pouring solder are provided. Length 15 inches.

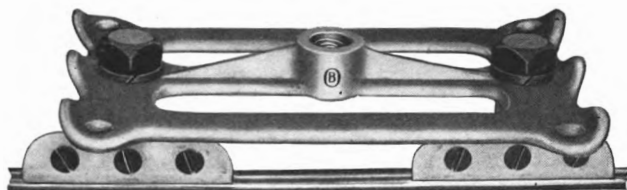
Code Word	No.							List per 100
<i>Balcony.</i>	10053—	Strain Ear for 0 Round Wire,					$\frac{3}{8}$ -inch Boss	\$ 95 00
<i>Baldly.</i>	10055—	" " 2-0 " " " "	"	"	"	"	"	95 00
<i>Baldness.</i>	10056—	" " 2-0 " " " "	"	"	"	"	"	95 00
<i>Baldwin.</i>	10057—	" " 3-0 " " " "	"	"	"	"	"	125 00
<i>Baleful.</i>	10058—	" " 3-0 " " " "	"	"	"	"	"	125 00
<i>Balker.</i>	10059—	" " 4-0 " " " "	"	"	"	"	"	125 00
<i>Balkish.</i>	10060—	" " 4-0 " " " "	"	"	"	"	"	125 00

Metropolitan Strain Plate

For Round, Figure 8 and Grooved Wires



Strain Plate with Clinch Ear



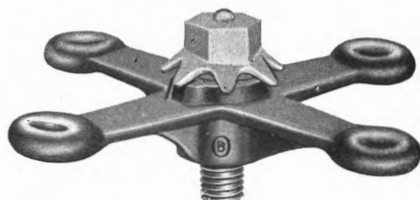
Strain Plate with Two Detroit, Form 1, Clamps—See Footnote

CONSISTS of a malleable iron casting which is intended to be supported by some form of straight line hanger, the boss in the Strain Plate being tapped for either a $\frac{5}{8}$ or $\frac{3}{4}$ -inch stud. Either a special Clinch Ear with two bosses or two Detroit, Form 1, Clamps may be used for supporting the trolley wire, being attached to Strain Plate by means of $\frac{5}{8}$ -inch stud bolts fitted with lock washers. A hole $\frac{1}{2}$ inch in diameter in each corner of the Strain Plate permits the attachment of guy wires. Length of Ear is $13\frac{1}{2}$ inches.

Code Word	No.	List per 100
Ballads.	2442—Strain Plate only, Mall. Iron, Galv., for $\frac{5}{8}$ -inch Hanger Stud..	\$ 90 00
Ballader.	6775— " " " " " " " "	90 00
Ballasts.	2444—Ear only, Clinch, for 0 B. & S. Round Wire	85 00
Ballots.	2445— " " 2-0 " " " "	85 00
Ballotin.	2446— " " 3-0 " " " "	110 00
Ballroom.	2447— " " 4-0 " " " "	110 00

The Detroit, Form 1, Trolley Clamp listed on page 64 may be used with the Metropolitan Strain Plates instead of the Clinch Ears listed above.

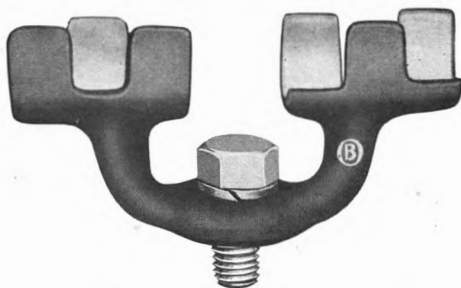
Swiveled Strain Yoke



SWIVELED Strain Yokes are used in combination with various styles of clamps and ears for guying and strain purposes. The attachment between the Strain Yoke and the ear is accomplished by means of a $\frac{5}{8}$ -inch or $\frac{3}{4}$ -inch stud bolt. They are made with two, three and four arms for two, three and four guy wires respectively, and the insulation can be obtained by the use of Conical or Wood Break Strain Insulators. Holes in arms are $\frac{1}{2}$ inch in diameter.

Code Word	No.					List per 100
<i>Balmify.</i>	4085—	Strain Yoke, Mall. Iron, Galvanized, for 2 Wires,	$\frac{5}{8}$ -inch Stud			\$45 00
<i>Balsam.</i>	6806—	" " " " 2	"	"		45 00
<i>Baluster.</i>	9868—	" " " " 3	"	"		55 00
<i>Banalitv.</i>	9869—	" " " " 3	"	"		55 00
<i>Bandaged.</i>	4086—	" " " " 4	"	"		55 00
<i>Bandanna.</i>	6807—	" " " " 4	"	"		55 00

Type A Feed-In Yoke



MADE of bronze with a galvanized machine bolt fitted with a lock washer. Lips are tinned for soldering, and will accommodate wire up to $\frac{1}{2}$ inch in diameter, thus permitting the use of No. 2-0 to 4-0, inclusive, feeder wire. Lower face of boss is machined so as to make a full contact with ear or clamp.

Code Word	No.				List per 100
<i>Bandbox.</i>	10378—	Feed-In Yoke, Bronze, $\frac{5}{8}$ -inch Stud			\$114 00
<i>Bandelet.</i>	10379—	" " " " $\frac{3}{4}$ -inch Stud			120 00

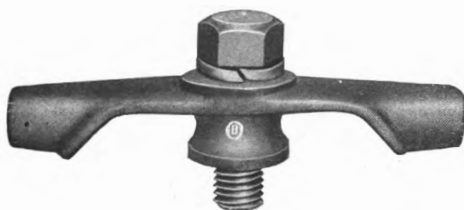
Grover Feed-In Hanger



BODY of Hanger is bell-shaped at the bottom, thus protecting the threaded portion of the bolt from the weather. Solid wire or cable not larger than $\frac{3}{8}$ inch in diameter can be used with this Hanger.

Code Word	No.	List per 100
<i>Bandit.</i>	2417—Feed-In Hanger, Bronze, $\frac{5}{8}$ -inch Stud.....	\$175 00
<i>Bandog.</i>	6973— " " $\frac{3}{4}$ "	175 00

Syracuse Feed-In Yoke



END lugs are tinned on the inside so that if desired suspension may be soldered to the wire. It is intended for use with wire or cable not greater than $\frac{1}{8}$ inches in diameter. The lower surface, which bears against top of boss of ear, is $1\frac{1}{4}$ inches in diameter, providing a good contact between ear and yoke.

Code Word	No.	List per 100
<i>Bandon.</i>	3197—Feed-In Yoke, Bronze, $\frac{5}{8}$ -inch Stud.....	\$66 50
<i>Bandore.</i>	6974— " " $\frac{3}{4}$ "	66 50

Clinch Anchor Ear

For Round Wire



LIPS are tinned for soldering, made of special bronze of high tensile strength. Length 8 inches. Diameter of hole for guy wire $\frac{3}{8}$ inch.

Code Word	No.	List per 100
<i>Bandy.</i>	4074—Anchor Ear for 0 B. & S. Round Wire.....	\$40 00
<i>Bainful.</i>	4075— " " 2-0 " " "	40 00
<i>Bainwort.</i>	4076— " " 3-0 " " "	50 00
<i>Bangle.</i>	4077— " " 4-0 " " "	50 00

Clinch Splicing Ear

For Round and Grooved Wires



THIS is a decided improvement over the old design formerly listed in that both the boss and web are greatly strengthened by the addition of a heavy rib at the top of the web and the design is such that a straight under-run is insured.

Code Word	No.	List per 100
<i>Banish.</i>	10360—Splicing Ear for 0 Round Wire, $\frac{5}{8}$ -inch Boss.....	\$110 00
<i>Banister.</i>	10361— " " 2-0 " " $\frac{5}{8}$ "	110 00
<i>Bankable.</i>	10362— " " 2-0 Grooved and 3-0 Round Wire, $\frac{5}{8}$ -in. Boss	137 00
<i>Bankbook.</i>	10363— " " 2-0 " " 3-0 " " $\frac{3}{4}$ "	137 00
<i>Banker.</i>	10364— " " 3-0 " " 4-0 " " $\frac{5}{8}$ "	137 00
<i>Bannerol.</i>	10365— " " 3-0 " " 4-0 " " $\frac{3}{4}$ "	137 00
<i>Bannock.</i>	10366— " " 4-0 " Wire, $\frac{5}{8}$ -inch Boss.....	137 00
<i>Bantams.</i>	10367— " " 4-0 " " $\frac{3}{4}$ "	137 00

Clark Splicing Ear

For Figure 8 Wire



INTENDED to be used without solder, the fastening obtained by set screws being amply secure for all ordinary conditions. Solder may be used in addition, however, the strength of the fastening being materially increased thereby. Length 12 inches.

Code Word	No.	List per 100
<i>Banter.</i>	2516—Splicing Ear for 0 B. & S. Fig. 8 Wire, $\frac{3}{8}$ -inch Boss.....	\$100 00
<i>Bantling.</i>	2517— “ “ 2-0 “ “ 8 “ “ “	100 00
<i>Baptism.</i>	2518— “ “ 3-0 “ “ 8 “ “ “	125 00
<i>Barbaric.</i>	2519— “ “ 4-0 “ “ 8 “ “ “	125 00

Clark Trolley Wire Splicer

For Figure 8 Wire



SAME design as the Clark Splicing Ear listed above, differing only in having the central boss omitted. Length 12 inches.

Code Word	No.	List per 100
<i>Barbary.</i>	2520—Splicer for 0 B. & S. Fig. 8 Wire.....	\$100 00
<i>Barbecue.</i>	2521— “ “ 2-0 “ “ 8 “ “ “	100 00
<i>Barbican.</i>	2522— “ “ 3-0 “ “ 8 “ “ “	125 00
<i>Bareback.</i>	2523— “ “ 4-0 “ “ 8 “ “ “	125 00

Combination Splicing Ear

Patented

For Round and Figure 8 Wires



AN efficient and practical device for splicing together a round and Fig. 8 wire. Solder is used for attaching round wire, while steel rivets or solder, or both, can be used for fastening Fig. 8 wire. Length 12 inches.

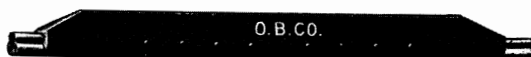
Code Word	No.						List per 100
<i>Barber.</i>	2078—	Combination Ear for	0 B. & S. Wire,	$\frac{5}{8}$ -inch	Boss	.....	\$100 00
<i>Barded.</i>	2505—	"	"	2-0	"	"	100 00
<i>Barefoot.</i>	2506—	"	"	3-0	"	"	125 00
<i>Barely.</i>	2507—	"	"	4-0	"	"	125 00

In ordering Ears state the name of gauge and gauge number of both the Round and Fig. 8 Trolley Wires.

Riveted Trolley Wire Splicer

Patented

Type A—For Figure 8 Wire



MADE by pressing heated plastic metal through dies which insure an absolutely uniform cross-section. The metal thus treated is much tougher and stronger than cast brass. Splicer is drilled on one side only for steel rivets which are furnished with each splicer.

Code Word	No.						List per 100
<i>Baritone.</i>	9976—	Riveted Splicer for	2-0	Fig. 8	Wire,	length 12 inches	.....\$102 50
<i>Barkless.</i>	9977—	"	"	3-0	"	"	125 00
<i>Barnacle.</i>	9978—	"	"	4-0	"	"	160 00

Trolley Wire Connector

For Round and Grooved Wires



MADE only from the best quality of hard drawn brass or copper, and when properly installed the joint obtained has a greater tensile strength than the wire. Central portion of connector is left solid and a milled slot is provided on each side of the center for pouring in solder.

Brass Connector

Code Word	No.						List per 100
<i>Barker.</i>	8700—	Connector,	10 x $\frac{3}{8}$ inch, for	0	B. & S. Round Wire	.....	\$ 75 00
<i>Barley.</i>	8650—	"	15 x $\frac{3}{8}$ "	0	" "	.....	100 00
<i>Baron.</i>	8701—	"	18 x $\frac{1}{2}$ "	0	" "	.....	127 50
<i>Baronage.</i>	8702—	"	10 x $\frac{3}{8}$ "	2-0	" "	.....	75 00
<i>Baronet.</i>	8651—	"	16 x $\frac{3}{8}$ "	2-0	" "	.....	115 00
<i>Baronial.</i>	8703—	"	18 x $\frac{1}{2}$ "	2-0	" "	.....	127 50
<i>Barpost.</i>	8704—	"	11 x $\frac{3}{4}$ "	3-0	" "	.....	140 00
<i>Barrack.</i>	8652—	"	18 x $\frac{1}{2}$ "	3-0	" "	.....	200 00
<i>Barrage.</i>	8705—	"	18 x $\frac{7}{8}$ "	3-0	" "	.....	250 00
<i>Barrenly.</i>	8706—	"	12 x $\frac{7}{8}$ "	4-0	" "	.....	165 00
<i>Barret.</i>	8653—	"	20 x $\frac{7}{8}$ "	4-0	" "	.....	275 00
<i>Barriers.</i>	8707—	"	11 x $\frac{3}{4}$ "	2-0	" Grooved "	.....	140 00
<i>Barrulet.</i>	8654—	"	18 x $\frac{1}{2}$ "	2-0	" "	.....	200 00
<i>Barter.</i>	8708—	"	18 x $\frac{7}{8}$ "	2-0	" "	.....	250 00
<i>Baseless.</i>	8709—	"	12 x $\frac{7}{8}$ "	3-0	" "	.....	165 00
<i>Basement.</i>	8655—	"	20 x $\frac{7}{8}$ "	3-0	" "	.....	275 00
<i>Bashful.</i>	8710—	"	12 x $\frac{7}{8}$ "	4-0	" "	.....	165 00
<i>Basify.</i>	8656—	"	20 x $\frac{7}{8}$ "	4-0	" "	.....	275 00

Copper Connector

<i>Basin.</i>	8712—	Connector,	15 x $\frac{3}{8}$ inch, for	0	B. & S. Round Wire	.....	\$150 00
<i>Basset.</i>	8713—	"	18 x $\frac{1}{2}$ "	0	" "	.....	200 00
<i>Basso.</i>	8715—	"	16 x $\frac{3}{8}$ "	2-0	" "	.....	150 00
<i>Basswood</i>	8720—	"	18 x $\frac{1}{2}$ "	2-0	" "	.....	200 00
<i>Baste.</i>	8722—	"	18 x $\frac{3}{4}$ "	3-0	" "	.....	225 00
<i>Bastile.</i>	8723—	"	18 x $\frac{3}{4}$ "	3-0	" "	.....	287 50
<i>Baston.</i>	8725—	"	20 x $\frac{7}{8}$ "	4-0	" "	.....	300 00
<i>Batable.</i>	8727—	"	18 x $\frac{3}{4}$ "	2-0	" Grooved "	.....	225 00
<i>Batch.</i>	8728—	"	18 x $\frac{7}{8}$ "	2-0	" "	.....	287 50
<i>Bateful.</i>	8730—	"	20 x $\frac{7}{8}$ "	3-0	" "	.....	300 00
<i>Bathe.</i>	8732—	"	20 x $\frac{7}{8}$ "	4-0	" "	.....	300 00

Emergency Trolley Wire Splicer

Patented

For Round Wire



ENDs of trolley wire are secured in place by two slotted steel caps serrated on the inside and tapered on the outside, the taper tending to compress the caps tightly upon the wires as the caps are drawn into correspondingly tapered recesses in splicer body. In making a splice the ends of the wire are first rounded slightly with a file, after which they are entered in Splicer with a sufficient pressure to force caps upon them for their full length. The normal strain upon the wire is sufficient to keep caps in place after they have been properly attached. Made of hard-drawn brass rod. Length 9 inches.

Code Word	No.		List per 100
<i>Batiste.</i>	2087—	Splicer for No. 0 B. & S. Round Wire.....	\$75 00
<i>Batter.</i>	2088—	“ “ 2-0 “ “ “	75 00

Trolley Wire Coupler

For Round Wire



MADE from high-grade, hard-drawn, seamless brass tubing. Four slotted openings are provided into which the wires are forced until flush with outer surface of Coupler; set screws placed opposite the openings serve to hold wire in position. Solder may be used in addition to the set screws if desired. Couplers are not tinned.

Code Word	No.		List per 100
<i>Batule.</i>	1131—	Coupler for 0 B. & S. Round Wire, length 15 inches.....	\$100 00
<i>Bauble.</i>	2525—	“ “ 2-0 “ “ “ “ 15 “	115 00
<i>Bawler.</i>	8688—	“ “ 3-0 “ “ “ “ 18 “	200 00
<i>Beach.</i>	8689—	“ “ 4-0 “ “ “ “ 20 “	275 00

K-I Trolley Wire Splicers

Regular



THE trolley wire is secured in place by means of tapered steel dogs, which are barbed on one side to grip the wire, and tapered on the other to correspond to the tapered inner wall of the Splicer. No soldering is necessary, as the tension of the wire is sufficient to keep the dogs in place.

Code Word	No.					List per 100
<i>Beacon.</i>	5692—	Splicer for No.	0	B. & S. Round Wire.		\$100 00
<i>Beagle.</i>	5693—	"	2-0	"	"	100 00
<i>Beaked.</i>	5694—	"	3-0	"	"	110 00
<i>Beamful.</i>	5695—	"	4-0	"	"	120 00
<i>Beard.</i>	5696—	"	0	Fig. 8	"	100 00
<i>Beast.</i>	5697—	"	2-0	"	8	100 00
<i>Beautiful.</i>	5698—	"	3-0	"	8	110 00
<i>Beaver.</i>	5699—	"	4-0	"	8	120 00
<i>Beckon.</i>	8571—	"	2-0	Grooved	"	110 00
<i>Bedeck.</i>	8572—	"	3-0	"	"	120 00
<i>Bedim.</i>	8573—	"	4-0	"	"	130 00
	5700—	Dogs for Splicer				6 00

In ordering Splicers for Grooved Wire specify name of Manufacturer of Wire.

Combination



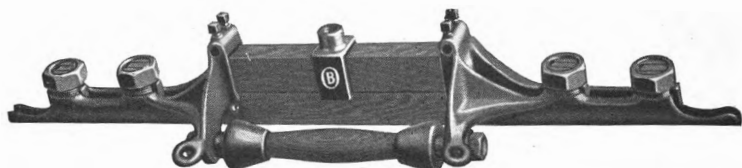
SIMILAR in internal construction to regular form listed above. One end is made for Round and the other end for Fig. 8 trolley wire.

Code Word	No.					List per 100
<i>Beehive.</i>	5703—	Splicer for	0	Fig. 8 to	0	Round Wire, length 10 inches. . . \$100 00
<i>Beetle.</i>	5705—	"	3-0	"	8	" 3-0 " or 2-0 Grooved Wire, length 12 inches. . . 110 00
<i>Beggar.</i>	5706—	Splicer for	4-0	Fig. 8 to	4-0	Round or 3-0 Grooved Wire, length 15 inches. . . 120 00
<i>Begrimmer.</i>	10414—	Splicer for	2-0	Round to	4-0	Round or 3-0 Grooved Wire, length 15 inches. . . 177 00
<i>Beguile.</i>	10415—	Splicer for	3-0	Fig. 8 to	4-0	Round or 3-0 Grooved Wire, length 15 inches. . . 180 00
<i>Behavior.</i>	5700—	Dogs for Splicer				6 00

In ordering Combination Splicers state name of gauge and gauge number of both Round and Fig. 8 Trolley Wires.

Type A Section Insulator

For Round, Figure 8 and Grooved Wires



USED to insulate one section of trolley wire from another and offer an unobstructed passage for trolley wheel from section to section. Two substantial end castings of bronze terminate in grooved ends for attachment to the trolley wire. The end castings are held together by two $1\frac{1}{4}$ -inch Wood Break Strain Insulators, giving 5 inches of insulation. The $\frac{5}{8}$ -inch machine bolts which thread into the cap castings of the wood breaks are secured by lock washers.

Suspension and runner bars are separate pieces of selected hard wood and fit into sockets in the end castings, the latter being held in place by two cotter pins, which pass through holes drilled in the end castings.

The ends of the trolley wires are held in the grooved extensions by clamping wedges. A feeder wire connection for 2-0 solid feeder wire is provided on top of each end casting.

The entire pull of the trolley wires is sustained by two wood break strain insulators, making a very strong construction. The wood breaks are in the same plane as the trolley wire and there is no tendency of the insulator to buckle. The clamping wedges form an exceptionally strong attachment for trolley wires, and the largest sizes of wire may be broken before slippage occurs. The wooden runner piece is easily replaced when necessary by simply removing the cotter pins.

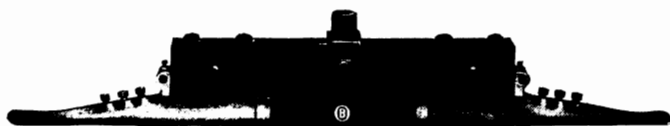
Length over all $29\frac{1}{8}$ inches; top suspension for $\frac{5}{8}$ -inch hanger stud; runner and suspension bars $1\frac{1}{2} \times 1\frac{1}{8} \times 9\frac{1}{8}$ inches.

Code Word	No.	List Each
<i>Birchen.</i>	9956—Insulator for 0, 2-0, 3-0 and 4-0 Rd., Fig. 8 and Grooved Wires.	\$12 50
<i>Birlaw.</i>	9957—Runner Piece.	3 00

Miami Section Insulator

For Round, Figure 8 and Grooved Wires

Hanger Suspension



BODY portion is a heavy block of thoroughly seasoned hickory to which bronze end castings are securely bolted. The outer ends of these castings are grooved at the bottom to receive the trolley wire, which is fastened in place by means of set screws. The lips on the end castings are arranged to clinch under the wire after the latter is in place. Runner piece is hard wood and is arranged so as to be easily removed and replaced. A feeder lug is provided on each end casting drilled for a 2-0 solid wire.

This device is intended for all classes of work, and because of its excellent construction it may be depended upon to give entire satisfaction under the most severe conditions. Has a straight under-run and offers a smooth passage for the trolley.

Provided with a suspension boss tapped for a $\frac{3}{8}$ -inch stud bolt and is designed to be supported by some form of straight line hanger.

Code Word	No.					List Each
<i>Behest.</i>	5805—	Hanger Suspension for	0 B. & S. Round Wire			\$10 00
<i>Belfry.</i>	5806—	"	2-0	"	"	10 00
<i>Bellow.</i>	5807—	"	3-0	"	"	12 50
<i>Bemoan.</i>	5808—	"	4-0	"	"	12 50
<i>Benedict.</i>	5809—	"	0	Fig. 8	"	10 00
<i>Benefic.</i>	5810—	"	2-0	"	8	10 00
<i>Benign.</i>	5811—	"	3-0	"	8	12 50
<i>Benumb.</i>	5812—	"	4-0	"	8	12 50
<i>Bequeath.</i>	5813—	"	2-0	Grooved	"	10 00
<i>Bequest.</i>	5814—	"	3-0	"	"	12 50
<i>Bereave.</i>	5815—	"	4-0	"	"	12 50
<i>Berry.</i>	5804—	Runner Piece				60

Fibre and Wood Break Section Insulators

For Round, Figure 8 and Grooved Wires



No. 4145—Insulator with Fibre Break

PROVIDED with either hard fibre or hard wood breaks, 12 inches long, to which are attached bronze end castings. A feeder lug is provided on each end casting drilled for a 2-0 feeder wire. Intended to be supported by some form of straight line hanger by means of suspension boss tapped for $\frac{3}{8}$ -inch stud.

With Fibre Break

Code Word	No.				List Each
<i>Beseech.</i>	3193—	Section Insulator for	0 B. & S. Round Wire		\$10 00
<i>Besought.</i>	4143—	"	2-0 "	" "	10 00
<i>Besiege.</i>	4144—	"	3-0 "	" "	12 50
<i>Betoken.</i>	4145—	"	4-0 "	" "	12 50
<i>Betrayed.</i>	4146—	"	0 "	Fig. 8 "	10 00
<i>Betwixt.</i>	4147—	"	2-0 "	" 8 "	10 00
<i>Beverage.</i>	4148—	"	3-0 "	" 8 "	12 50
<i>Bewilder.</i>	4149—	"	4-0 "	" 8 "	12 50
<i>Bewitch.</i>	4150—	"	2-0 "	Grooved "	10 00
<i>Biblical.</i>	4151—	"	3-0 "	" "	12 50
<i>Bickern.</i>	4152—	"	4-0 "	" "	12 50
<i>Bicuspid.</i>	3195—	Fibre Break			1 50

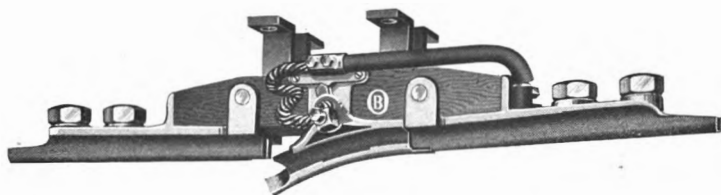
With Wood Break

(For Mine Use Only)

<i>Bidental.</i>	5720—	Section Insulator for	0 B. & S. Round Wire		\$10 00
<i>Bijerous.</i>	5721—	"	2-0 "	" "	10 00
<i>Biiform.</i>	5722—	"	3-0 "	" "	12 50
<i>Bigamy.</i>	5723—	"	4-0 "	" "	12 50
<i>Bigoted.</i>	5724—	"	0 "	Fig. 8 "	10 00
<i>Billet.</i>	5725—	"	2-0 "	" 8 "	10 00
<i>Billiard.</i>	5726—	"	3-0 "	" 8 "	12 50
<i>Binary.</i>	5727—	"	4-0 "	" 8 "	12 50
<i>Binnacle.</i>	5728—	"	2-0 "	Grooved "	10 00
<i>Biology.</i>	5729—	"	3-0 "	" "	12 50
<i>Biometry.</i>	5730—	"	4-0 "	" "	12 50
<i>Biramous.</i>	5719—	Wood Break			3 00

Automatic Mine Section Insulator

For Round, Figure 8 and Grooved Wires



INTENDED for use in mines where it is desired to keep the trolley on any section alive only when a locomotive is operating in that section. The function of the device is to automatically close the circuit as locomotive enters upon the section and to open it as locomotive passes out. The switch mechanism is operated by pressure of trolley wheel against central rocker portion, and the switch is so arranged that the circuit is not opened or closed except when no current is being drawn through the switch. This does away with destructive arcing and burning of the switch contacts. Attachment can be made directly to mine roof timbers by means of the braces shown on top. The trolley wires are attached rigidly to each of the end castings by means of two heavy clamps.

The device can also be used on overhead construction where it is desired to maintain a trolley section which is not used frequently and upon which current is to be maintained only when a car is operating on that section.

Code Word	No.	List Each
<i>Biscotin.</i>	9034—Section Insulator for Nos. 0, 2-0, 3-0 and 4-0 Round, Fig. 8 and Grooved Wires.....	\$17 00
<i>Bisect.</i>	9035—Switch Clips and Screws.....	70
<i>Bisque.</i>	9036—Locking Springs.....	1 00

In ordering specify size and style of Wire with which it is to be used.

Insulated Adjustable Cross-Over

Type A, Forms 1-4

For Round, Figure 8 and Grooved Wires

THE improved forms of Cross-Overs in the following list supersede the corresponding forms of the old style Miami Cross-Overs.

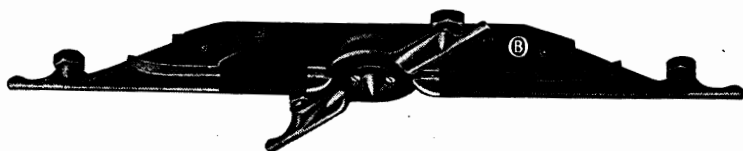
The Type A Cross-Over has a perfectly straight under-run, the live crossings are strengthened to prevent buckling and the wire is held in grooved extensions by clamping wedges so securely that the largest sizes of trolley wire will break before slippage occurs.

The hard wood insulating bars are made from carefully selected, thoroughly seasoned stock, treated with an insulating and preservative paint.

The work of installation is quickly and easily accomplished as it is not necessary to cut the trolley wires.

A wide range of angular adjustment is possible, the Cross-Over being adaptable to any angle between 45 and 90 degrees.

Form 1



For two single trolley wires crossing each other.

Code Word
Bistort.

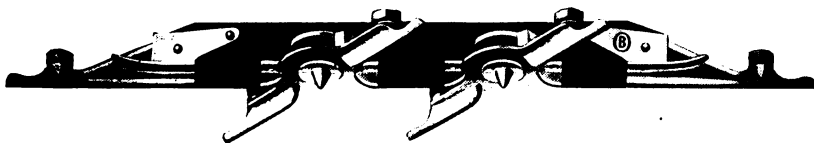
No.	List Each
9984—Cross-Over, Form 1, for 0, 2-0, 3-0 and 4-0 Round, Fig. 8 and Grooved Wires.....	\$15 00

Insulated Adjustable Cross-Over

Type A, Forms 1-4—Continued

For Round, Figure 8 and Grooved Wires

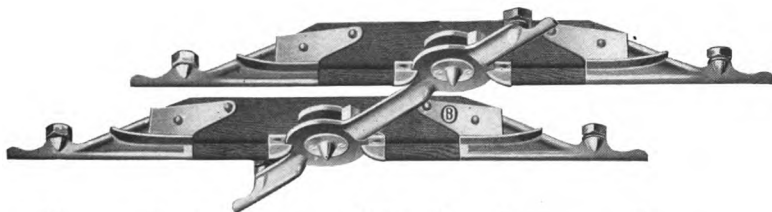
Form 2



For two live parallel trolley wires crossing a dead one.

Code Word	No.	List Each
<i>Biting.</i>	9985—Cross-Over, Form 2, for 0, 2-0, 3-0 and 4-0 Round, Fig. 8 and Grooved Wires.....	\$22 50

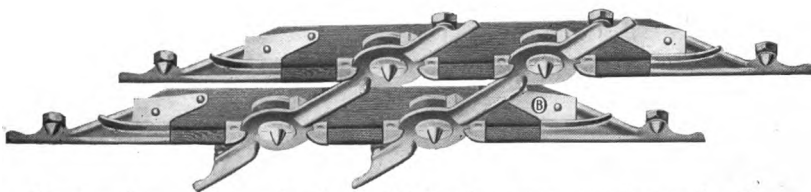
Form 3



For crossing two dead parallel trolley wires over a live one.

Code Word	No.	List Each
<i>Bitter.</i>	9986—Cross-Over, Form 3, for 0, 2-0, 3-0 and 4-0 Round, Fig. 8 and Grooved Wires.....	\$30 00

Form 4



For two live and two dead parallel trolley wires crossing each other.

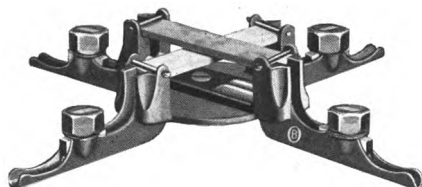
Code Word	No.	List Each
<i>Bivious.</i>	9987—Cross-Over, Form 4, for 0, 2-0, 3-0 and 4-0 Round, Fig. 8 and Grooved Wires.....	\$40 00

In ordering Cross-Overs state the angle of crossing and the separation between the parallel Trolley Wires.

Live Adjustable Cross-Overs

For Round, Figure 8 and Grooved Wires

Type A



FOR use at trolley wire crossings where it is not desired to insulate the wires from each other and where the angle of crossing is not less than 30 degrees.

It is made of heavy bronze castings, designed so as to afford ample strength with minimum weight.

Two heavy galvanized steel bars reinforce the castings at the center and absolutely prevent buckling. It has a straight under-run for the trolley wheel.

The installation is a simple matter as it is not necessary to cut the wires or use solder. The wire is held in the grooved extensions by clamping wedges which form such a strong attachment that the largest sizes of trolley wire will break before slippage occurs.

Code Word	No.	List Each
<i>Bivouac.</i>	9988—Type A Cross-Over for 0, 2-0, 3-0 and 4-0 Round, Fig. 8 and Grooved Wires.....	\$10 00

Type B

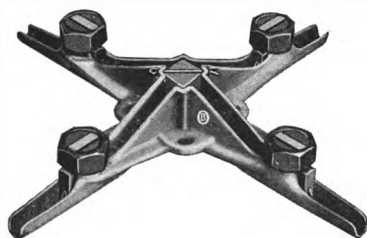


SIMILAR to Cross-Over listed above with the exception that it is not reinforced at the center. Recommended for mine use only.

Code Word	No.	List Each
<i>Blacken.</i>	10411—Type B Cross-Over for 0, 2-0, 3-0 and 4-0 Round, Fig. 8 and Grooved Wires.....	\$9 80

Live Rigid Cross-Overs

Right Angle

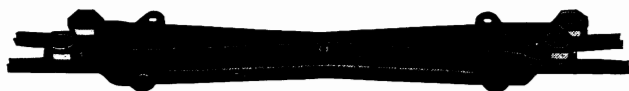


THIS Cross-Over is provided with incline plane runways which insure a smooth passage for the trolley wheel.

The ribs are reinforced at the center by a square block to prevent buckling.

Code Word	No.	List Each
<i>Blackish.</i>	10372—Right Angle Cross-Over, Bronze, for 0, 2-0, 3-0 and 4-0 Round, Fig. 8 and Grooved Wire.....	\$7 95

Acute Angle



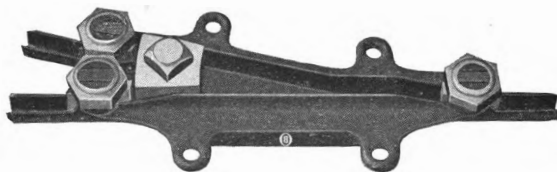
THE runways in this Cross-Over are in an inclined plane which insures a smooth passage for the trolley wheel.

Code Word	No.	List Each
<i>Blamable.</i>	10382—Cross-Over, 8° angle, Bronze, for 0, 2-0, 3-0 and 4-0 Round, Fig. 8 and Grooved Wires	\$12 95
<i>Blanch.</i>	10383—Cross-Over, 15° angle, Bronze, for 0, 2-0, 3-0 and 4-0 Round, Fig. 8 and Grooved Wires	12 95

The 8° angle Cross-Over may be used for 6° to 10° angles, and the 15° angle Cross-Over may be used for 10° to 20° angles.

Type A Trolley Frogs

With Four Pull-Off Rings



IN the Type A Frogs listed on the opposite page the designation "right-hand," "left-hand," etc., indicates the direction of the turnout. For ordinary city service, with turnout radii not exceeding 50 feet, the 20° frogs are suitable, but with the longer radii introduced by suburban and interurban work, smaller divergence angles are necessary, and the employment of high speeds has necessitated the use of longer pans to allow overcoming the inertia of the trolley wheel in transition between the inner ends of tongues.

The following table gives range of distance from track switch point to track frog with which each set of trolley frogs may be most satisfactorily used:

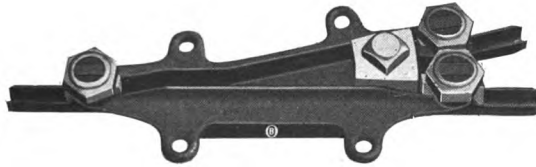
Frog Distance	Divergence Angle of Trolley Frog
Up to 22 feet.....	20°
From 20 to 30 feet	15°
Above 28 feet.....	8°

The minimum frog distance given in the table, with which the 15° frogs may be used to best advantage, corresponds to a turnout radius of 40 feet, but when suburban cars using high speed trolley wheels run over city tracks it is advisable to use 15° rather than 20° frogs throughout the city construction, even where the minimum frog distance is less than 20 feet.

In order to insure smooth transition of the wheel between tongue and pan, the pans of all Type A Frogs have, at each end, an inclined plane rising at a very acute angle from the horizontal, which receives the flange of the wheel at a point depending upon the depth of the wheel groove, the depth of tongues and rise of the inclined plane admitting the use of a groove depth from $\frac{3}{4}$ to $1\frac{1}{8}$ inches.

Type A Trolley Frogs

With Four Pull-Off Rings



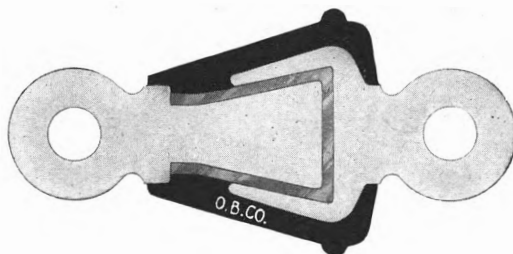
Code Word	No	List Each
<i>Camping.</i>	10527—Right-hand Frog, 20° angle, for Nos. 0 and 2-0, B. & S. Round, Fig. 8 and Grooved Wires.....	\$ 7 50
<i>Blandly.</i>	10013—Right-hand Frog, 20° angle, for Nos. 3-0 and 4-0, B. & S. Round, Fig. 8 and Grooved Wires.....	7 50
<i>Campus.</i>	10528—Left-hand Frog, 20° angle, for Nos. 0 and 2-0 B. & S. Round, Fig. 8 and Grooved Wires.....	7 50
<i>Blarney.</i>	10014—Left-hand Frog, 20° angle, for Nos. 3-0 and 4-0, B. & S. Round, Fig. 8 and Grooved Wires.....	7 50
<i>Canard.</i>	10529—V Frog, 20° angle, for Nos. 0 and 2-0, B. & S. Round, Fig. 8 and Grooved Wires.....	7 50
<i>Blatter.</i>	10385—V Frog, 20° angle, for Nos. 3-0 and 4-0, B. & S. Round, Fig. 8 and Grooved Wires.....	7 50
<i>Blazing.</i>	10015—Right-hand Frog, 15° angle, for Nos. 0 to 4-0 inclusive, B. & S. Round, Fig. 8 and Grooved Wires.....	10 00
<i>Bleuch.</i>	10016—Left-hand Frog, 15° angle, for Nos. 0 to 4-0 inclusive, B. & S. Round, Fig. 8 and Grooved Wires.....	10 00
<i>Bleakish.</i>	10386—V Frog, 15° angle, for Nos. 0 to 4-0 inclusive, B. & S. Round, Fig. 8 and Grooved Wires.....	10 00
<i>Blender.</i>	8685—Right-hand Frog, 8° angle, for Nos. 0 to 4-0 inclusive, B. & S. Round, Fig. 8 and Grooved Wires.....	15 00
<i>Blight.</i>	8686—Left-hand Frog, 8° angle, for Nos. 0 to 4-0 inclusive, B. & S. Round, Fig. 8 and Grooved Wires.....	15 00
<i>Blinder.</i>	8687—V Frog, 8° angle, for Nos. 0 to 4-0 inclusive, B. & S. Round, Fig. 8 and Grooved Wires.....	15 00
<i>Blinkard.</i>	8642—Three-way Frog, 15° angle, for Nos. 0 to 4-0 inclusive, B. & S. Round, Fig. 8 and Grooved Wires.....	12 50

In ordering Frogs specify the angle desired.

Conical Strain Insulators

Patent Pending

Regular



Sectional View—Catalogue No. 10008

USED for insulating span wires and also guy wires under light strains. The regular type listed below, and the clevis and the large eye types listed on the next page are of a new and improved design as described below, and supersede the old forms of Premier Insulators formerly listed.

The device consists of a galvanized malleable iron cup casting compressed over a malleable iron cone by a 60-ton pressure. A heavy layer of formed sheet mica covers the cone and thoroughly insulates it from the cup. Dirigo Insulation gives the device a symmetrical form and affords ample weather protection. If desired Nos. 10008 and 10009 can be furnished with eye castings at right angles to each other.

Each Insulator is given a severe mechanical and electrical test, greatly in excess of service requirements, before shipment. It possesses exceptional mechanical and electrical strength and no displacement of parts can occur in service. All the strain is borne by the castings and intervening mica. The Dirigo composition simply acts as a weather-proof covering to protect the interior construction.

No. 10008—Length, center to center of Eyes.....	3½ inches
“ 10009— “ “ “ “ “	4¼ “

Code Word	No.	List per 100
<i>Blüthe.</i>	10008—Insulator, 2-inch diameter, ½-inch Eyes	\$60 00
<i>Bloomed.</i>	10009— “ 2½ “ ½ “	70 00

Conical Strain Insulators

Patent Pending

With Clevis



IS of the same interior construction as the regular form described on the opposite page. Length, center of eye to center of bolt of Insulator No. 10010, is $4\frac{3}{8}$ inches; No. 10011, $5\frac{1}{4}$ inches.

Code Word	No.	List per 100
Blooming.	10010—Insulator, 2-inch diameter, $\frac{1}{2}$ -inch Eyes	\$70 00
Blossom.	10011— " 2 $\frac{1}{2}$ " $\frac{1}{2}$ "	85 00

With Large Eye



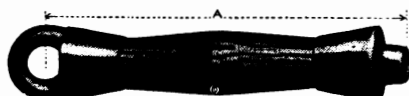
IN interior construction is similar to the regular form listed on the opposite page. Length, center to center of eyes, is $4\frac{3}{8}$ inches.

Code Word	No.	List per 100
Blotched.	10012—Insulator, 2 $\frac{1}{2}$ -inch diameter, $\frac{3}{4}$ and $\frac{1}{2}$ -inch Eyes	\$85 00

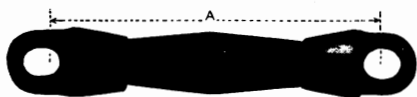
Wood Break Strain Insulators



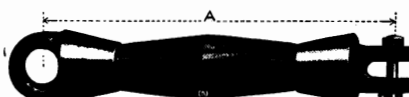
Regular



Goose Neck



Long Eye



Clevis

THIS form of Strain Insulator is exceedingly reliable and popular, and consists of a selected hickory insulating member provided with tapering ends, over which are compressed, by means of hydraulic pressure, thoroughly annealed malleable iron caps. The relation of the taper of the ends of the wood member to its diameter and the cross-section of metal in the caps has been carefully worked out to give maximum strength.

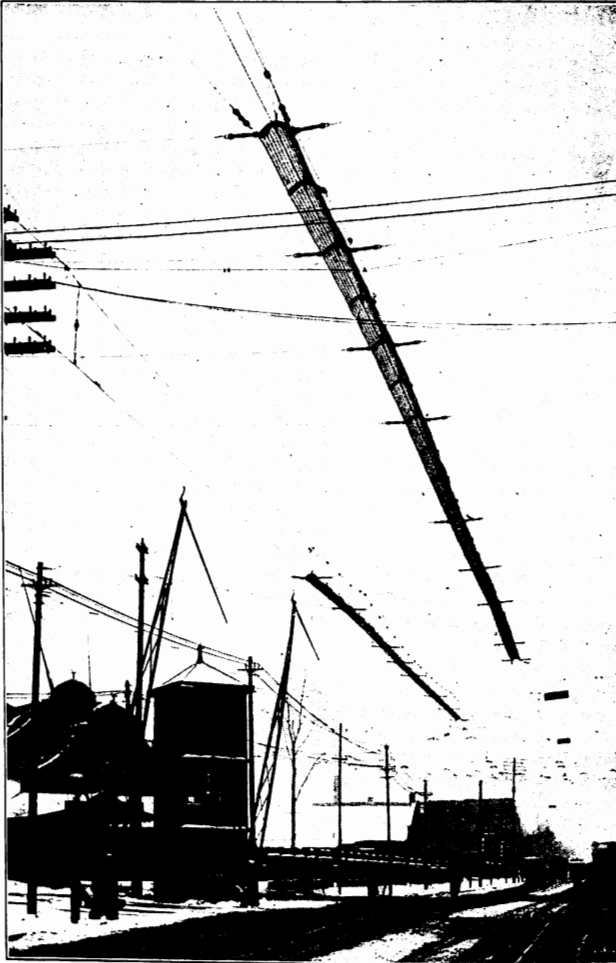
Every Insulator is tested at a strain equaling or exceeding service conditions before being shipped.

Code Word	No.	Type	Smallest Diameter in Inches	Dimension "A" in Inches	Length of Wood Insulation between Metal Parts	Voltage	List per 100
<i>Boaster.</i>	8574	Regular	1	9	5 inches	650	\$42 50
<i>Boasting.</i>	8628	"	1 1/4	9 3/4	5 "	650	55 00
<i>Bobbinet.</i>	10384	"	1 1/2	10 7/8	5 "	650	75 00
<i>Bobolink.</i>	*9974	Long Eye	1	9 3/4	5 "	650	47 50
<i>Borneol.</i>	*10472	"	1 1/4	11 1/8	5 "	650	57 85
<i>Bodkin.</i>	9238	Clevis	1	9 1/2	5 "	650	52 50
<i>Bollard.</i>	10295	"	1 1/4	10	5 "	650	60 95
<i>Bolster.</i>	8575	Goose Neck	1	9	5 "	650	50 00
<i>Bombard.</i>	10296	"	1 1/4	9 3/4	5 "	650	43 20
<i>Bombast.</i>	8622	Regular	1	18	14 "	1200	55 00
<i>Bonanza.</i>	9237	"	1 1/4	18 1/2	14 "	1200	75 00
<i>Bondage.</i>	10297	Clevis	1	18 1/2	14 "	1200	57 55
<i>Bonfire.</i>	10298	"	1 1/4	19	14 "	1200	67 60
<i>Boniform.</i>	10299	Goose Neck	1	18	14 "	1200	39 45
<i>Bootless.</i>	10300	"	1 1/4	18 3/4	14 "	1200	49 50
<i>Boreas.</i>	10301	Regular	1 1/4	28 1/2	24 "	3300	85 80

*Nos. 9974 and 10472 Insulators have extra long eyes for attachment to pole collars and these Insulators cannot be used with pull-overs, etc.

National Trolley Guard

Patented

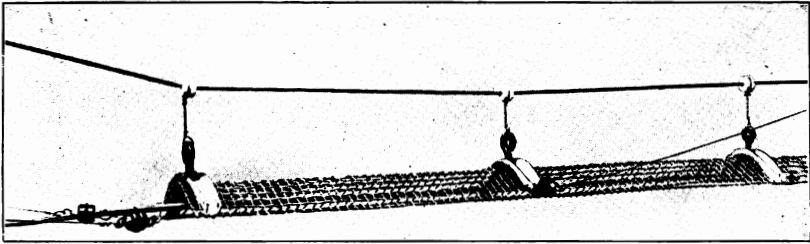


National Trolley Guard Installed at Railroad Crossing

See following pages for description and list.

National Trolley Guard

Continued



Detail View Showing Hanger Yokes and Eye Bolts

THE National Trolley Guard is designed to prevent electric cars from being stalled on steam road crossings. It may also be used to advantage on sharp curves, undergrade crossings or at other points where trouble is experienced in keeping the trolley wheel on the wire.

The Guard is made in one piece of woven wire and furnished in any desired length for either single or double trolley wire. It is made either entirely of copper wire or of heavily galvanized iron wire for the approaches with a copper wire section extending over the steam railroad track for a distance of three feet on each side so as to avoid corrosion of the galvanized iron wire due to locomotive gases.

The generous proportions of wire mesh, Roebling No. 10, with selvage wire, Roebling No. 6, together with substantial hanger yokes, spaced five feet apart, give ample strength and rigidity to withstand severe blows from the trolley wheel and the action of the natural elements.

The open mesh, one inch square, offers practically no resistance to the exhaust gases and steam from the stack of a locomotive passing under the Guard. Ice and snow cannot accumulate on this type of Guard, and the open mesh reduces to a minimum the possible effects from heavy winds. These features, together with the extreme lightness of the Guard, (18 ounces per running foot of galvanized iron wire and copper wire), make it unnecessary to provide heavy stays and poles with concrete settings in order to properly and safely support the appliance.

When in position, the Guard assumes the form of a perfect inverted trough. There are no projections to catch on or interfere with a trolley wheel when running on the mesh.

National Trolley Guard

Continued

In the manufacture of the galvanized Guard special attention is given to the galvanizing process.

The construction insures practically silent running of the trolley wheel on the Guard. This fact is of special importance in considering a safety appliance of this kind.

To meet every possible condition the Guard is furnished for the protection of both single and double trolley. The width of the single Guard is ten inches and the depth is five inches. The width of the double Guard is fifteen inches, with double trolley six inches between centers, and the depth is five inches.

The hanger yokes, which are made of galvanized iron with clips at either end, hold the mesh to its proper shape and are provided with means for fastening the side stays. Five-eighth or three-quarter inch eye bolts with set nuts and washers are furnished to clamp the ear and the mesh to the under body of the hanger yoke, effecting a practical and durable connection.

In designing this Guard the number of parts entering into its construction has been reduced to a minimum, namely woven wire and hangers. These features facilitate shipping, making each complete order consist of only a roll of wire with requisite hangers and accessories. By means of a forming tool furnished with each order the wire guard can be easily shaped to conform to the hanger yokes, and as soon as the yokes are attached the Guard is permanently held in the proper shape.

Actual service on many roads has proved that this device affords a strong element of protection against accidents at steam road crossings and the Manufacturers state that if the Guard does not perform its functions thoroughly, after a fair test, it may be returned.

They also state that they will protect customers against any patent litigation, and will take action against anyone infringing their patent.

		For Single Trolley		List per Foot
Code Word	No.			
<i>Borough.</i>	9840—	Single Guard, Galvanized Iron,	3-inch Stud	\$3 75
<i>Bossage.</i>	9841—	" " " "	" "	3 75
<i>Bottler.</i>	9844—	" " Copper,	" "	4 75
<i>Boulter.</i>	9845—	" " " "	" "	4 75
		For Double Trolley		
<i>Bouquet.</i>	9846—	Double Guard, Galvanized Iron,	3-inch Stud	\$4 88
<i>Boviform.</i>	9847—	" " " "	" "	4 88
<i>Bowable.</i>	9947—	" " Copper,	" "	6 50
<i>Bowery.</i>	9948—	" " " "	" "	6 50

Specification blanks, giving full directions for ordering the National Trolley Guard, will be sent on request.

Feeder Wire Insulators

Dirigo Insulation



No. 8648



Nos. 8646 and 8297



No. 7627

CATALOGUE No. 8648, Side Bearing Insulator, Form 1, is adapted for use on corner construction, as the feeder wire is supported at the side of the Insulator, close to the cross arm, thus placing the strain on the insulator pin to the best advantage.

It consists of a malleable iron shell into which is moulded Dirigo Insulation. Size of pin hole is one inch.

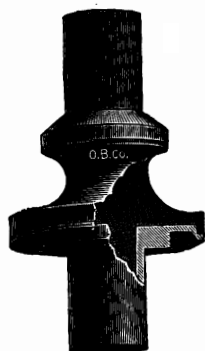
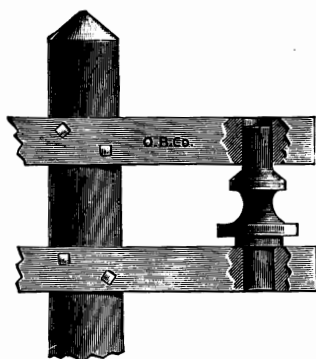
The Nos. 8646 and 8297 Top and Side Bearing Insulators, Form 1, are similar to the Side Bearing Insulator described above with the addition of a receptacle on the top. The upright prongs, being of malleable iron, may be bent down over the feeder wire to secure it in place. Size of pin hole is 1 inch.

The No. 7627 Top and Side Bearing Insulator, Form 2, is made entirely of Dirigo Insulation, and is suitable for both straight line and corner suspension, the top groove being used for the former and the side groove for the latter.

Code Word	No.	List per 100
<i>Bracteal.</i>	8648—Side Bearing Insulator, Form 1, for Wire $1\frac{1}{2}$ inches in diameter or less.....	\$ 82 50
<i>Bragger.</i>	8646—Top and Side Bearing Insulator, Form 1, for Wire $1\frac{1}{2}$ inches in diameter or less.....	82 50
<i>Braiding.</i>	8297—Top and Side Bearing Insulator, Form 1, for Wire $1\frac{3}{8}$ inches in diameter or less.....	95 00
<i>Brained.</i>	7627—Top and Side Bearing Insulator, Form 2, for Wire $1\frac{3}{8}$ inches in diameter or less.....	125 00

Grover Corner Insulator

For Feeder Wires



THE Grover Corner Insulator, as its name implies, is intended for supporting and insulating heavy feeder wires at corners or angles where sharp turns are made. Its construction and method of use are indicated in the above cuts. In practice it is supported between two wooden cross arms, which are bored with $1\frac{1}{2}$ -inch holes to receive the ends of the Insulator. It can be used with the heaviest feeder wires, and, on account of being supported at both ends, will withstand very severe strains. The body of the Insulator is a malleable iron casting, which is covered with a thick layer of Dirigo Insulation. This covers both ends and also extends under the flanged portion of the Insulator, as shown in the cross-sectional view above.

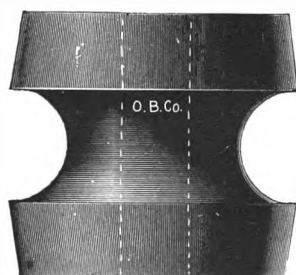
Code Word
Brainy.

No.
4327—Insulator

List per 100
\$131 25

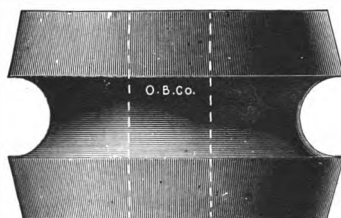
Dirigo Insulating Spools

THESE Spools, being made of Dirigo Insulation, provide a stronger and better insulator than either porcelain or glass, and are particularly adapted for use where a higher degree of insulation and greater strength are required. The No. 4202 shown on the following page is recommended for heavy strains, and should be fitted with a $\frac{5}{8}$ -inch bolt or lag screw when so used.



Code Word
Bramble.

No. 4201—Spool, $1\frac{1}{4}$ in. high, 2 in. in diameter, $\frac{1}{2}$ in. hole List per 100 \$30 00

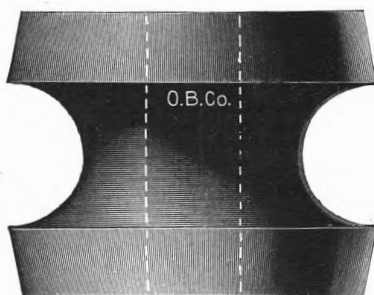


The thickness of insulation around bolt hole is $\frac{1}{8}$ of an inch.

Code Word
Brandied.

No. 9769—Spool, $1\frac{1}{2}$ in. high, $2\frac{1}{4}$ in. in diameter, $\frac{1}{8}$ in. hole List per 100 \$40 00

Dirigo Insulating Spool



Code Word
Bravely.

No. 4202—Spool, 2 in. high, $2\frac{1}{2}$ in. in diameter, $\frac{3}{4}$ in. hole..... List per 100 \$50 00

Uninsulated Eye Bolt



Code Word
Bravery.

No.					List per 100
4203—	Eye Bolt,	$\frac{1}{2}$ x 10 inches,	Plain.....		\$12 50
4204—	"	" $\frac{1}{2}$ x 10 "	Galvanized.....		16 25
7813—	"	" $\frac{3}{8}$ x 10 "	Plain.....		18 75
7814—	"	" $\frac{5}{8}$ x 10 "	Galvanized.....		22 50
1177—	"	" $\frac{1}{2}$ x 12 "	Plain.....		14 40
2549—	"	" $\frac{1}{2}$ x 12 "	Galvanized.....		17 40
1178—	"	" $\frac{5}{8}$ x 12 "	Plain.....		18 75
2550—	"	" $\frac{5}{8}$ x 12 "	Galvanized.....		23 35
7549—	"	" $\frac{1}{2}$ x 14 "	Plain.....		16 25
7550—	"	" $\frac{1}{2}$ x 14 "	Galvanized.....		18 75
7551—	"	" $\frac{5}{8}$ x 14 "	Plain.....		21 25
7552—	"	" $\frac{5}{8}$ x 14 "	Galvanized.....		25 65

Insulated Eye Bolt

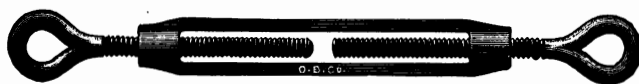


Code Word
Briery.
Brigade.
Brigand.
Brimless.

No.					List per 100
2551—	Eye Bolt,	$\frac{1}{2}$ x 12 inches,	Porcelain Break, Galvanized	....	\$49 40
2553—	"	" $\frac{5}{8}$ x 12 "	" " "	....	59 40
2555—	"	" $\frac{1}{2}$ x 12 "	Dirigo " "	....	76 90
2557—	"	" $\frac{5}{8}$ x 12 "	" " "	....	86 90

Uninsulated Turnbuckle

With Two Eyes



Code Word	No.							List per 100
<i>Brindle.</i>	2558—	Turnbuckle, 9-in. opening,	$\frac{1}{2}$ -in. Eye Bolts, Galvanized...	\$	87	75		
<i>Bristle.</i>	2561—	" 9 "	$\frac{5}{8}$ " " "		101	25		
<i>Broach.</i>	7554—	" 12 "	$\frac{5}{8}$ " " "		116	90		
<i>Brocade.</i>	7556—	" 12 "	$\frac{3}{4}$ " " "		158	75		

Uninsulated Turnbuckle

With Eye and Hook



Code Word	No.							List per 100
<i>Brocatel.</i>	2559—	Turnbuckle, 9-in. opening,	$\frac{1}{2}$ -in. Eye Bolts, Galvanized...	\$	88	15		
<i>Brocket.</i>	2563—	" 9 "	$\frac{5}{8}$ " " "		103	75		
<i>Broiler.</i>	7558—	" 12 "	$\frac{5}{8}$ " " "		116	90		

Insulated Turnbuckle

With Insulated Eye Bolt



One of the eye bolts of the Turnbuckle is insulated from the body by a heavy covering of Dirigo Insulation.

Code Word	No.							List per 100
<i>Broiling.</i>	4206—	Turnbuckle, 6-in. opening,	$\frac{3}{8}$ -in. Eye Bolts, Galvanized...	\$	175	00		

Insulated Turnbuckle With Brooklyn



THIS device is a combination of an Uninsulated Turnbuckle and a Brooklyn Strain Insulator. It is made up of the Uninsulated Turnbuckle No. 2561, listed on page 105, and the Single Brooklyn Strain Insulator No. 9995.

Code Word
Broking.

No.	List per 100
4198—Turnbuckle, Malleable Iron, Galvanized.....	\$190 00

Insulated Turnbuckle With Dirigo Spools



Code Word
Bromide.
Broncho.
Brooch.

No.	List per 100
2568—Turnbuckle, 9-in. opening, $\frac{1}{2}$ -in. Forked Bolts, Galvanized	\$150 00
2570— " 9 " $\frac{5}{8}$ " " "	175 00
7562— " 12 " $\frac{3}{4}$ " " "	220 00

Insulated Turnbuckle With Porcelain Spools

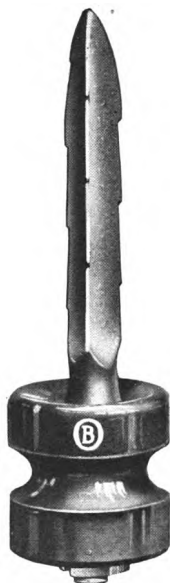


Code Word
Brooklet.
Brother.
Browed.

No.	List per 100
2564—Turnbuckle, 9-in. opening, $\frac{1}{2}$ -in. Forked Bolts, Galvanized	\$150 00
2566— " 9 " $\frac{5}{8}$ " " "	175 00
7564— " 12 " $\frac{3}{4}$ " " "	220 00

Security Mine Feeder Wire Insulator

Type A—Patented



No. 3207



No. 3210



No. 3208



No. 3209

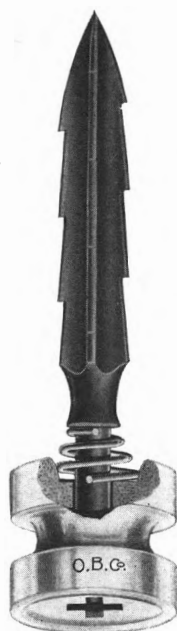
AS its name implies, the Security Mine Feeder Wire Insulator is intended for supporting and insulating feeder wires in mines. It consists of three parts, viz.: semi-porcelain Insulator, malleable iron Pin and Locking Washer. One end of the Pin is pointed, fluted and barbed to make it easy to drive into the wall or roof of the mine, and to secure a firm anchorage in it when in place. The opposite end is formed to facilitate placing the Insulator on it easily and quickly and then securely holding it there. Grooves are provided through the Insulator to drain off any moisture which may accumulate and run down the Pin.

It will accommodate feeder wires up to and including No. 4-0, B. & S.

Code Word	No.	List per 100
<i>Browse.</i>	3207—Insulator complete for No. 4-0 B. & S. Feeder Wire.....	\$17 90
<i>Bruise.</i>	3208—Semi-Porcelain Insulator.....	5 60
<i>Brussels.</i>	3209—Malleable Iron Pin.....	11 15
<i>Brutal.</i>	3210— “ “ Washer.....	1 20

Security Mine Feeder Wire Insulator

Type B—Patented



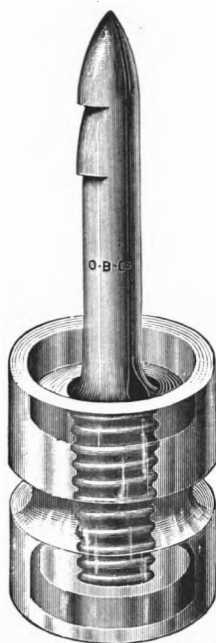
THE Type B Security Insulator is similar to the Type A, except that it is so constructed as to make the insulation perfectly rigid when in use.

It is also provided with a spring, which is strongly recommended when the Insulator is to be used in a horizontal position. It is not necessary to use a spring when the Insulator is placed in the roof of the mine or in a vertical position, as the insulator spool would then be in a position to lock itself upon the pin.

Code Word	No.	List per 100
<i>Bubble.</i>	8737—Insulator complete with Spring.....	\$19 75
<i>Buckram.</i>	8738— " " without "	16 75
<i>Budding.</i>	8739—Semi-Porcelain Insulator only.....	5 60
<i>Buffer.</i>	8740—Spring only.....	3 00
<i>Bulbous.</i>	3209—Malleable Iron Pin only.....	11 15

Standard Mine Feeder Wire Insulator

Patented



THE above cut shows a view of an insulating support for feeder wires in mines. The malleable iron Pin is threaded on one end to receive the Insulator, which is made of glass, and pointed and barbed on the other to fasten it in position by driving into the roof of the mine. The Glass Insulator is recessed on the end and the Pin is hollowed in the center, with an opening provided from the outside, for the purpose of preventing moisture from running down the latter from the roof of the mine and collecting on the feeder wire.

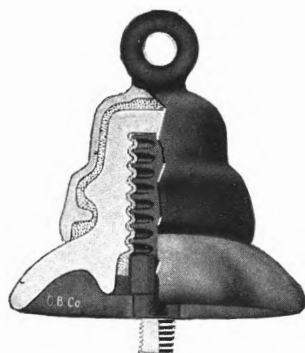
Code Word	No.	List per 100
<i>Bullet.</i>	2622—Insulator complete for No. 4-0 B. & S. Feeder Wire.....	\$32 50
<i>Bulwark.</i>	2096—Glass Insulator	14 40
<i>Bumble.</i>	2097—Malleable Iron Pin.....	18 10

Insulated Arc Lamp Hanger

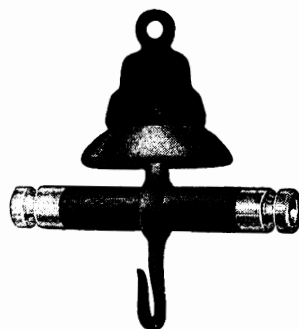
Type A, for 10,000 Volts



Cat. No. 9961



Cat. No. 9962



Cat. No. 9963

THIS Hanger is a high grade, perfectly insulated and mechanically strong support for electric arc lamps and is made in three forms: with hook suspension, threaded stud suspension and hook and spreader arm.

The porcelain insulator is cemented in the cap casting with special cement, and the cap casting and porcelain insulator are designed with interlocking flanges which put a compression instead of a shearing strain on the cement. This interlocking feature makes it impossible for the parts to separate, so that the lamp could not fall to the street even if the cement should become loose.

The lower casting is screwed into the porcelain insulator and is also cemented. The threads on this casting and in the insulator interlock, thus having the same advantages as described for the cap casting.

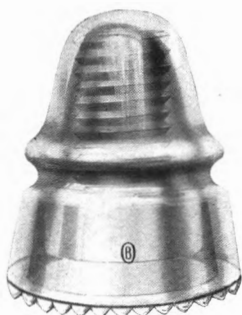
The wide skirt of the one-piece insulator prevents surface leakage or arcing over of current.

Each form of Hanger is given a dry test at 50,000 volts and a precipitation test at 25,000 volts, the latter being at $1\frac{1}{4}$ inch in five minutes at a 45 degree angle.

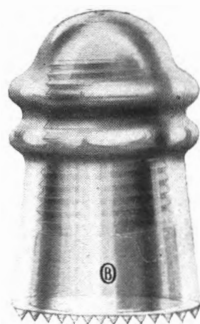
Diameter of Porcelain Insulator.....	5	inches
Stud, 20 threads per inch, diameter.....	$\frac{5}{8}$	"
Opening of Hook.....	$\frac{1}{2}$	"
Length of Spreader Arm.....	$13\frac{7}{8}$	"

Code Word	No.	List per 100
Bungalow.	9961—Insulated Arc Lamp Hanger with Hook.....	\$175 00
Bungle.	9962— " " " " Threaded Stud.....	187 50
Bunker.	9963— " " " " Hook and Spreader Arm.....	225 00

Glass Insulators



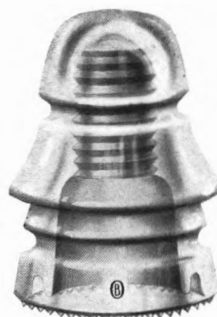
No. 2614



No. 2615



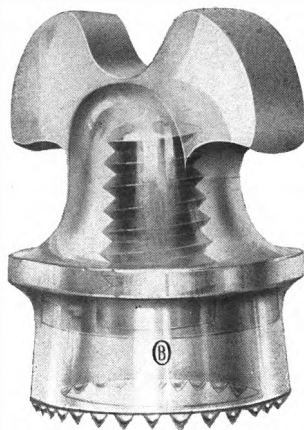
No. 4430



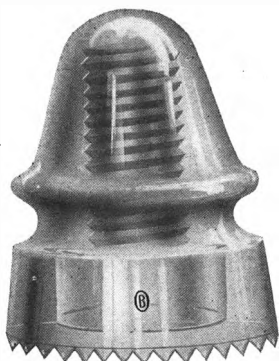
No. 7628

Code Word	No.	Description	For Size Wire	Approx. Weight packed per 1000	Quantity in Barrel	List per 100
<i>Buoyancy.</i>	2614	Pony, Double Petticoat, Deep Groove	No. 4 B. & S. Telephone " "	930 lbs.	300	\$ 3 00
<i>Burden:</i>	2615	Standard Pony		785 "	400	2 10
<i>Burdock.</i>	4430	Pony, D'ble Groove		795 "	400	2 10
<i>Bureau.</i>	7628	Transposition, D'ble Petticoat		2100 "	125	10 00

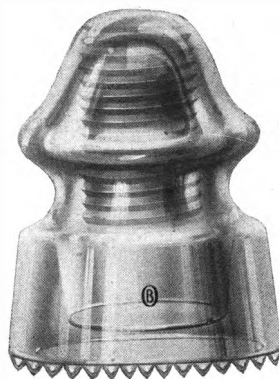
Glass Insulators



Nos. 1231—4328



No. 1233



No. 1232

Code Word	No.	Description	For Size Wire	Approx. Weight packed per 1000	Quantity in Barrel	List per 100
<i>Burglar.</i>	1233	Double Petticoat, Deep Groove	No. 0 B. & S. " 4-0 " 1½" & smaller 2" "	1400 lbs.	200	\$4 70
<i>Burgonet.</i>	1232	Double Petticoat, Extra Large G've		1400 "	200	4 70
<i>Burrower.</i>	1231	Top Groove		2250 "	100	9 10
<i>Bushment.</i>	4328	" "		2250 "	100	9 10

Insulating Knobs

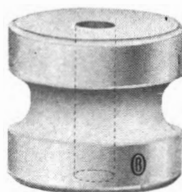
Porcelain and Glass



No. 10459



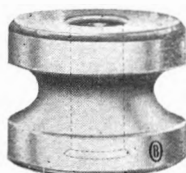
No. 10460



Nos. 1169-7548



No. 4200



No. 2545



No. 4199

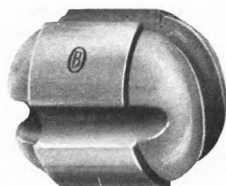


No. 2543

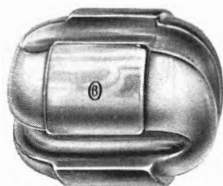
Code Word	No.	Description	Std. No.	Height Inches	Diam. Inches	Diam. Hole Inches	Diam. Groove Inches	Approx. Weight packed per 1000 in lbs.	Quantity in Barrel	List per 100
<i>Cabaret.</i>	10459	Porc.	5½	1 9/16	1	1/8	5/16	80	5000	\$ 0 90
<i>Cabbage.</i>	10460	"	4½	1 1/8	1 1/2	1/8	7/16	250	2000	1 40
<i>Cabinet.</i>	1169	"	24	1 3/4	2	7/16	7/16	400	1000	4 15
<i>Caboose.</i>	7548	"	24	1 3/4	2	7/16	7/16	400	1000	4 15
<i>Cackle.</i>	4200	"	1	3 1/4	2 1/8	7/16	3/4	800	650	8 80
<i>Caddish.</i>	2545	"	0	2 1/4	2 7/8	7/16	1	1100	350	14 70
<i>Cadence.</i>	4199	Glass	1	1 1/2	1 1/2	7/16	7/16	235	500	1 75
<i>Caducity.</i>	2543	"	7	2 1/8	2	7/16	7/16	550	500	3 00

Circuit Breaks

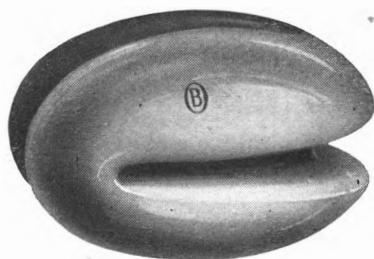
Porcelain and Glass



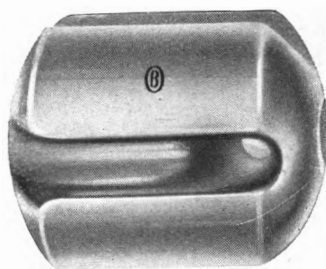
Nos. 9461-9462



Nos. 1166-7547



No. 9469



Nos. 10341-10343

Code Word	No.	Description	Diameter Inches	Length Inches	Diameter Grooves Inches	Approx. Weight per 100 in lbs.	List per 100
<i>Cajoler.</i>	9461	Porcelain	2 $\frac{5}{16}$	2 $\frac{9}{16}$		62 $\frac{1}{2}$	\$ 7 45
<i>Caladium.</i>	9462	"	2 $\frac{3}{4}$	3 $\frac{1}{4}$		112 $\frac{1}{2}$	9 25
<i>Calamite.</i>	9469	"	3 $\frac{1}{4}$	5		300	26 25
<i>Calamus.</i>	10341	"	2 $\frac{3}{8}$	3 $\frac{1}{8}$		90	20 00
<i>Calcify.</i>	10342	"	2 $\frac{3}{8}$	3 $\frac{1}{2}$		125	25 00
<i>Calcine.</i>	10343	"	3 $\frac{1}{4}$	5 $\frac{1}{2}$		290	40 00
<i>Calefy.</i>	1166	Glass	2 $\frac{1}{4}$	2 $\frac{1}{2}$		62	9 40
<i>Calico.</i>	7547	"	2 $\frac{3}{4}$	3 $\frac{1}{4}$		102	14 00

O-B Hi-Tension Porcelain Insulators

General Description

THE O-B Hi-Tension Porcelain Insulators illustrated on the following pages are made from a special high grade of porcelain, which is a combination of foreign and domestic clays, especially selected to give a body of maximum mechanical and electrical strength.

Porcelain is generally conceded to be more reliable for high voltage insulators than glass, and this is especially true on the extremely high voltages. One particular difficulty with glass is to secure a uniform and proper anneal, which if not obtained produces internal strains, which may develop any time after the insulators are installed.

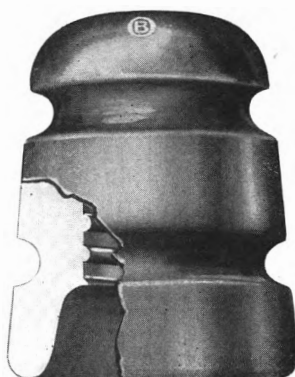
Every step in the manufacture through which O-B Insulators pass, from the clay bin to the shipping floor, is carefully watched. Every stage of the process is given a careful inspection, and before finally passing to the shipping room each Insulator is subjected to a high voltage test equal to not less than double the normal voltage to which the insulator is to be subjected in service. The exposed surface of each Insulator is given a brown glaze, the purpose of which is to render the surface smooth and to impart to it a color, thus making it less liable to gather dirt and less conspicuous. Glazes of other colors can be supplied when desired, such as slate color and white.

O-B Hi-Tension Insulators for working voltages, up to and including 11,000 volts only, are listed in this Catalogue. See foot note below.

For complete listing of O-B Hi-Tension Porcelain
Insulators up to 150,000 Volts, see our
Porcelain Insulator Catalogue
Copy Mailed on Request

O-B Porcelain Insulator

Pony—Double Groove



No. 9400

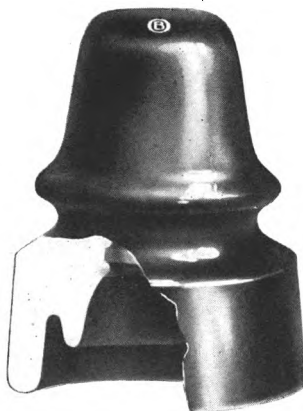
Diameter of Insulator.....	2 $\frac{5}{16}$ in.
Height of Insulator.....	2 $\frac{11}{16}$ "
Diameter of wire groove.....	$\frac{3}{8}$ "
Size of pin hole.....	1 "
Approximate Net Weight, per 100, in lbs.....	52
Approximate Weight packed, per 100, in lbs.....	60
Approximate Number in barrel.....	400

Code Word	No.	List per 100
Buskin.	9400—Double Groove Insulator for Telephone Wire.....	\$4 50

For complete listing of O-B Hi-Tension Insulators see Insulator Catalogue.

O-B Porcelain Insulator

Deep Groove—Double Petticoat



No. 9990

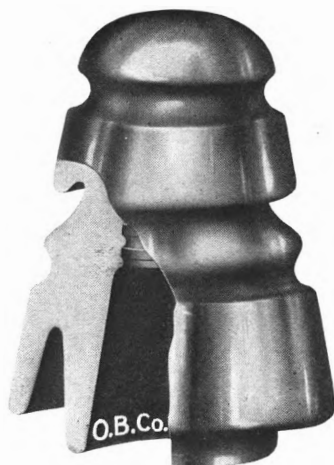
Diameter of Insulator.	3 $\frac{1}{4}$ in.
Height of Insulator.	4 "
Diameter of wire groove.	$\frac{7}{8}$ "
Size of pin hole.	1 "
Approximate Net Weight, per 100, in lbs.	120
Approximate Weight packed, per 100, in lbs.	145
Approximate Number in barrel.	150

Code Word	No.	List per 100
Bustler.	9990—Deep Groove, Double Petticoat Insulator.	\$10 00

For complete listing of O-B Hi-Tension Insulators see Insulator Catalogue.

O-B Porcelain Insulator

Transposition



No. 9889

Diameter of Insulator.	3 $\frac{3}{8}$ in.
Height of Insulator.	4 $\frac{5}{8}$ "
Diameter of wire groove	$\frac{3}{8}$ "
Size of pin hole.	1 "
Approximate Net Weight, per 100, in lbs.	150
Approximate Weight packed, per 100, in lbs.	175
Approximate Number in barrel.	150

Code Word
Butcher.

No.

9889—Transposition Insulator for Telephone Wire. \$18 75

List per 100

For complete listing of O-B Hi-Tension Insulators see Insulator Catalogue.

O-B Porcelain Insulator

Deep Grooved—Double Petticoat—4000 Volts



No. 10387

Working Voltage.....	4000
Leakage Surface	2 in.
Arcing Distance, wet	$\frac{3}{4}$ "
Diameter of Insulator	$3\frac{1}{4}$ "
Height of Insulator.....	3 "
Diameter of groove.....	$\frac{3}{4}$ "
Size of pin hole.....	1 "
Approximate Net Weight, per 100, in lbs.....	80
Approximate Weight packed, per 100, in lbs.....	100
Approximate Number in barrel	225

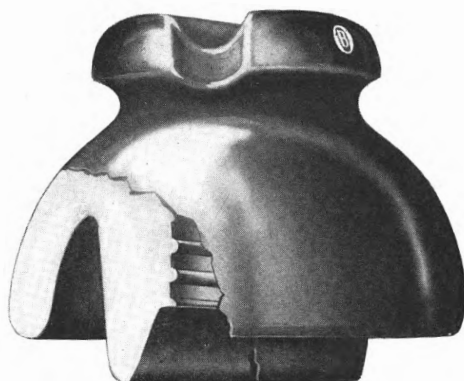
Code Word	No.	List per 100
Butler.	10387—Insulator for 4000 Volts	\$9 50

The actual working voltage desired should be specified on all orders or inquiries.

For complete listing of O-B Hi-Tension Insulators see Insulator Catalogue.

O-B Porcelain Insulator

5000-6600 Volts



Nos. 9938-9403

CATALOGUE NUMBERS	9938	9403
Working Voltage	5000	6600
Leakage Surface	4½ in.	5½ in.
Arcing Distance, wet.....	1¼ "	1¼ "
Diameter of Insulator.....	3½ "	3¾ "
Height of Insulator	2¾ "	3 "
Diameter of top groove	⅝ "	⅝ "
Diameter of side groove	½ "	½ "
Size of pin hole	1	1
Approximate Net Weight, per 100, in lbs.....	90	120
Approximate Weight packed, per 100, in lbs	115	140
Approximate Number in barrel	250	175

Code Word	No.	List per 100
Calidity.	9938—Insulator for 5000 Volts	\$8 38
Caliph.	9403— " " 6600 "	9 25

The actual working voltage desired should be specified on all orders or inquiries.

For complete listing of O-B Hi-Tension Insulators see Insulator Catalogue.

O-B Porcelain Insulator

6600 Volts



No. 9404

Working Voltage.	6600
Leakage Surface.	5 in.
Arcing Distance, wet.	1 $\frac{1}{4}$ "
Diameter of Insulator.	3 $\frac{3}{4}$ "
Height of Insulator.	3 "
Diameter of top groove.	1 $\frac{1}{4}$ "
Diameter of side groove.	$\frac{3}{4}$ "
Size of pin hole.	1 "
Approximate Net Weight, per 100, in lbs.	110
Approximate Weight packed, per 100, in lbs.	130
Approximate Number in barrel.	175

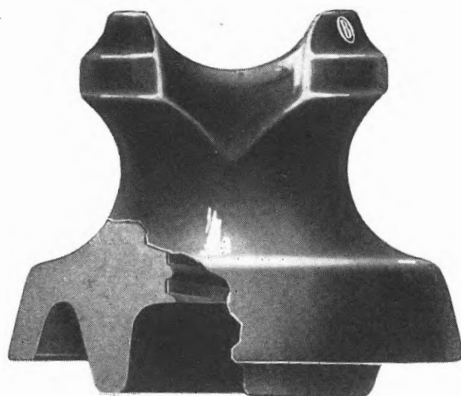
Code Word	No.	List per 100
Callus.	9404—Insulator for 6600 Volts	\$9 25

The actual working voltage desired should be specified on all orders or inquiries.

For complete listing of O-B Hi-Tension Insulators see Insulator Catalogue.

O-B Porcelain Insulator

6600 Volts



No. 10041

Working Voltage.	6600
Leakage Surface.	3 $\frac{3}{4}$ in.
Arcing Distance, wet.	1 $\frac{1}{4}$ "
Diameter of Insulator.	3 $\frac{3}{4}$ "
Height of Insulator.	3 $\frac{1}{8}$ "
Diameter of top groove.	1 $\frac{1}{2}$ "
Diameter of side groove.	1 $\frac{1}{2}$ "
Size of pin hole.	1 "
Approximate Net Weight, per 100, in lbs.	110
Approximate Weight packed, per 100, in lbs.	130
Approximate Number in barrel.	175

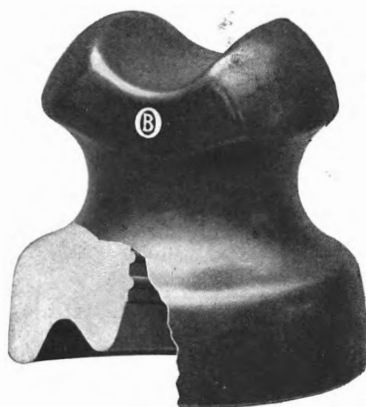
Code Word	No.	List per 100
Caloric.	10041—Insulator for 6600 Volts	\$16 25

The actual working voltage desired should be specified on all orders or inquiries.

For complete listing of O-B Hi-Tension Insulators see Insulator Catalogue.

O-B Porcelain Insulator

6600 Volts



No. 9953

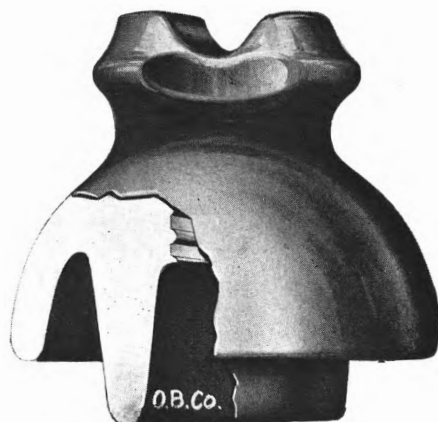
Working Voltage.....	6600
Leakage Surface.....	3 $\frac{3}{4}$ in.
Arcing Distance, wet	1 $\frac{1}{4}$ "
Diameter of Insulator.....	3 $\frac{11}{16}$ "
Height of Insulator.....	3 $\frac{1}{2}$ "
Diameter of top groove.....	1 $\frac{1}{2}$ "
Diameter of side groove.....	1 $\frac{1}{2}$ "
Size of pin hole.....	1 "
Approximate Net Weight, per 100, in lbs.....	150
Approximate Weight packed, per 100, in lbs.	175
Approximate Number in barrel.....	140

Code Word	No.	List per 100
Calotype.	9953—Insulator for 6600 Volts.....	\$20 00

The actual working voltage desired should be specified on all orders or inquiries.
For complete listing of O-B Hi-Tension Insulators see Insulator Catalogue.

O-B Porcelain Insulator

11,000 Volts



No. 9406

Working Voltage.	11,000
Test Voltage.	40,000
Leakage Surface.	7½ in.
Arcing Distance, wet.	1½ "
Diameter of Insulator.	4⅜ "
Height of Insulator.	4⅛ "
Diameter of top groove.	1⅛ "
Diameter of side groove.	¾ "
Size of pin hole.	1 "
Use a 1-inch pin with length above cross arm not less than.	4 "
Approximate Net Weight, per 100, in lbs.	200
Approximate Weight packed, per 100, in lbs.	220
Approximate Number in barrel.	90

Code Word	No.	List per 100
Calver.	9406—Insulator for 11,000 Volts.	\$34 00

The actual working voltage desired should be specified on all orders or inquiries.

For complete listing of O-B Hi-Tension Insulators see Insulator Catalogue.

O-B Porcelain Insulator

11,000 Volts



No. 9890 For Cable

Working Voltage.....	11,000
Test Voltage.	40,000
Leakage Surface.....	4 $\frac{3}{4}$ in.
Arcing Distance.....	1 $\frac{1}{2}$ "
Diameter of Insulator.....	4 $\frac{1}{4}$ "
Height of Insulator.....	4 $\frac{1}{4}$ "
Diameter of top groove.....	1 $\frac{7}{8}$ "
Diameter of side groove.....	1 $\frac{1}{2}$ "
Size of pin hole.....	1 $\frac{3}{8}$ "
Use a 1 $\frac{3}{8}$ -inch pin with length above cross arm not less than.....	4 "
Approximate Net Weight, per 100, in lbs.....	265
Approximate Weight packed, per 100, in lbs.....	315
Approximate Number in barrel.....	70

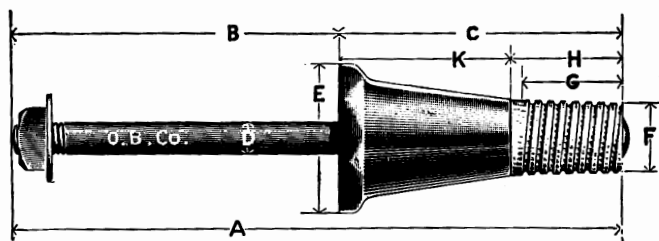
Code Word	No.	List per 100
Camber.	9890—Insulator for 11,000 Volts.....	\$41 25

The actual working voltage desired should be specified on all orders or inquiries.

For complete listing of O-B Hi-Tension Insulators see Insulator Catalogue.

Steel Pins

With Porcelain Base



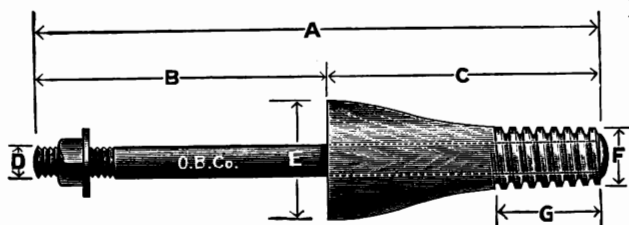
THE threaded portion of these Pins is made of thoroughly paraffined oak. The bolt is forged from high carbon steel and binds the broad porcelain base to the cross arm so as to give maximum strength. The pin is not subject to deterioration by weathering or burning, and adds to the electrical strength of the insulator.

Code Word	No.	Finish	Dimensions in Inches									List per 100
			A	B	C	D	E	F	G	H	K	
<i>Endower.</i>	9849	Plain	6	1 $\frac{1}{4}$	4 $\frac{3}{4}$	1 $\frac{1}{2}$	2 $\frac{5}{8}$	1	1 $\frac{1}{2}$	1 $\frac{3}{4}$	3	\$20 00
<i>Endurant.</i>	10481	Galv.	6	1 $\frac{1}{4}$	4 $\frac{3}{4}$	1 $\frac{1}{2}$	2 $\frac{5}{8}$	1	1 $\frac{1}{2}$	1 $\frac{3}{4}$	3	21 00
<i>Endurer.</i>	9850	Plain	6	1 $\frac{3}{8}$	4 $\frac{5}{8}$	1 $\frac{1}{2}$	2 $\frac{1}{2}$	1	2	2 $\frac{3}{8}$	2 $\frac{1}{4}$	19 62
<i>Enervate.</i>	10482	Galv.	6	1 $\frac{3}{8}$	4 $\frac{5}{8}$	1 $\frac{1}{2}$	2 $\frac{1}{2}$	1	2	2 $\frac{3}{8}$	2 $\frac{1}{4}$	20 62
<i>Engager.</i>	9851	Plain	9	5	4	1 $\frac{1}{2}$	2 $\frac{1}{2}$	1	1 $\frac{1}{2}$	1 $\frac{3}{4}$	2 $\frac{1}{4}$	20 75
<i>Engender.</i>	10483	Galv.	9	5	4	1 $\frac{1}{2}$	2 $\frac{1}{2}$	1	1 $\frac{1}{2}$	1 $\frac{3}{4}$	2 $\frac{1}{4}$	23 50
<i>Engraver.</i>	9852	Plain	9 $\frac{1}{2}$	4 $\frac{3}{4}$	4 $\frac{3}{4}$	1 $\frac{1}{2}$	2 $\frac{5}{8}$	1	1 $\frac{1}{2}$	1 $\frac{3}{4}$	3	21 75
<i>Engross.</i>	10484	Galv.	9 $\frac{1}{2}$	4 $\frac{3}{4}$	4 $\frac{3}{4}$	1 $\frac{1}{2}$	2 $\frac{5}{8}$	1	1 $\frac{1}{2}$	1 $\frac{3}{4}$	3	24 00
<i>Engulf.</i>	9853	Plain	9 $\frac{1}{2}$	4 $\frac{3}{4}$	4 $\frac{3}{4}$	1 $\frac{1}{2}$	2 $\frac{5}{8}$	1	2	2 $\frac{3}{8}$	2 $\frac{1}{4}$	21 00
<i>Enhance.</i>	10485	Galv.	9 $\frac{1}{2}$	4 $\frac{3}{4}$	4 $\frac{3}{4}$	1 $\frac{1}{2}$	2 $\frac{1}{2}$	1	2	2 $\frac{3}{8}$	2 $\frac{1}{4}$	23 25
<i>Enjoyer.</i>	9854	Plain	10 $\frac{1}{2}$	5 $\frac{1}{2}$	5 $\frac{3}{8}$	1 $\frac{1}{2}$	2 $\frac{5}{8}$	1	2	2 $\frac{3}{8}$	3	23 38
<i>Enlight.</i>	10486	Galv.	10 $\frac{1}{2}$	5 $\frac{1}{2}$	5 $\frac{3}{8}$	1 $\frac{1}{2}$	2 $\frac{5}{8}$	1	2	2 $\frac{3}{8}$	3	26 38
<i>Enlist.</i>	9855	Plain	6	5 $\frac{1}{4}$	5 $\frac{1}{4}$	1 $\frac{1}{2}$	2 $\frac{5}{8}$	1 $\frac{3}{8}$	2	2 $\frac{1}{4}$	3	22 75
<i>Ensign.</i>	10487	Galv.	6	5 $\frac{1}{4}$	5 $\frac{1}{4}$	1 $\frac{1}{2}$	2 $\frac{5}{8}$	1 $\frac{3}{8}$	2	2 $\frac{1}{4}$	3	23 75

For complete listing of High Tension Pins see Insulator Catalogue No. 2.

Steel Pins

With All Wool Top

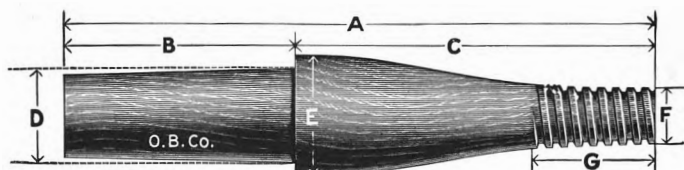


THESE Pins consist of a high carbon steel bolt fitted with a nut and washer and a paraffined wood top. They are strong and durable and will withstand considerable lateral strain. They also possess the advantage of requiring but a small hole in the cross arm, which adds considerably to the strength of the latter. They are furnished with two sizes of threaded ends, the standard being 1 inch, and the large size $1\frac{3}{8}$ inches in diameter at the upper end.

Code Word	No.	Finish	Dimensions in Inches							List per 100
			A	B	C	D	E	F	G	
<i>Canaster.</i>	9503	Plain	6	1	5	$1\frac{1}{2}$	$2\frac{1}{4}$	1	2	\$19 12
<i>Cadent.</i>	9488	Galv.	6	1	5	$1\frac{1}{2}$	$2\frac{1}{4}$	1	2	21 12
<i>Candied.</i>	7955	Plain	9	5	4	$1\frac{7}{8}$	$1\frac{7}{8}$	1	2	16 25
<i>Candify.</i>	9489	Galv.	9	5	4	$1\frac{7}{8}$	$1\frac{7}{8}$	1	2	19 00
<i>Canine.</i>	9490	Plain	$9\frac{1}{2}$	5	$4\frac{1}{2}$	$1\frac{7}{8}$	$1\frac{7}{8}$	1	2	15 00
<i>Canker.</i>	9491	Galv.	$9\frac{1}{2}$	5	$4\frac{1}{2}$	$1\frac{7}{8}$	$1\frac{7}{8}$	1	2	17 25
<i>Cannibal.</i>	9492	Plain	$10\frac{1}{2}$	$5\frac{1}{2}$	5	$2\frac{1}{4}$	$2\frac{1}{4}$	1	2	21 25
<i>Cannon.</i>	9493	Galv.	$10\frac{1}{2}$	$5\frac{1}{2}$	5	$2\frac{1}{4}$	$2\frac{1}{4}$	1	2	24 25
<i>Canoeing.</i>	9494	Plain	$10\frac{1}{2}$	$5\frac{1}{2}$	5	$2\frac{1}{4}$	$1\frac{3}{8}$	2	2	23 00
<i>Canonist.</i>	9495	Galv.	$10\frac{1}{2}$	$5\frac{1}{2}$	5	$2\frac{1}{4}$	$1\frac{3}{8}$	2	2	26 00

For complete listing of High Tension Pins see Insulator Catalogue No. 2.

Wood Pins



THESE Pins are made from the best of selected stock, and have been designed particularly for use with the High Tension Insulators illustrated on the preceding pages. All oak and locust pins are furnished plain with the exception of Pin No. 1248, which is painted, but these pins can be furnished to order specially treated with paraffine, when desired. Special sizes not listed below can also be furnished on short notice.

Code Word	No.	Stock	Dimensions in Inches							List per 100
			A	B	C	D	E	F	G	
<i>Cantata.</i>	2639	Locust	8	4	4	1½	1½	1	2	\$ 3 90
<i>Canteen.</i>	9504	Krekose	8	4	4	1½	1½	1	2	3 65
<i>Canticle.</i>	1248	Oak	9	4½	4¾	1½	1¾	1	2½	2 35
<i>Cantlet.</i>	1249	Locust	9	4½	4¾	1½	1¾	1	2½	4 70
<i>Capsize.</i>	9507	Krekose	9	4½	4¾	1½	1¾	1	2½	3 90
<i>Capsule.</i>	7855	Locust	11½	4½	7½	1½	2	1	2½	10 00
<i>Captain.</i>	7863	Locust	11½	4½	7½	1½	2	1¾	2½	10 00
<i>Caption.</i>	7867	Locust	11½	5	6½	2	2½	1¾	2½	13 20
<i>Captive.</i>	9964	Krekose	15	5	10	2	2½	1¾	2½	24 00

For complete listing of High Tension Pins see Insulator Catalogue No. 2.

Malleable Iron Pin



THE length of the plain end below the shoulder is $3\frac{1}{2}$ inches, and $4\frac{1}{4}$ inches on the threaded part above shoulder.

Code Word	No.	List per 100
<i>Captor.</i>	1250— $1\frac{1}{2}$ x $7\frac{1}{4}$ inch, threaded end 1 inch in diameter.....	\$10 42

Forged Steel Pin

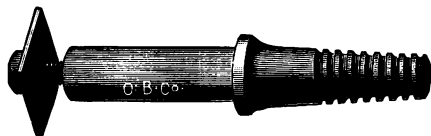
With Small Wood Top



THIS Pin has a threaded and paraffined hard wood thimble on the top which is 1 inch in diameter. It is provided with a shoulder at the top, and a nut and washer at the bottom of the shank, to attach it rigidly to wooden cross arms of the regular thickness.

Code Word	No.	List per 100
<i>Caracole.</i>	4455—Pin $9\frac{1}{2}$ inches long, Shank $\frac{1}{2}$ inch in diameter, Wood Top $2\frac{3}{8}$ inches high.....	\$11 25

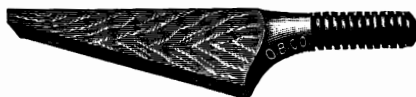
Drop Forged Iron Pin



THE length of the Pin is $7\frac{1}{4}$ inches; 3 inches on the plain end beneath the shoulder, and $4\frac{1}{4}$ inches on the threaded part above it. The threaded end is 1 inch in diameter. Other sizes furnished to specifications.

Code Word	No.	List per 100
<i>Caramel.</i>	2112— $1\frac{1}{2}$ -inch Pin, with End Bolt and Washer.....	\$70 88
<i>Caravan.</i>	2640— $1\frac{1}{2}$ " " without " " "	65 50

Wood Side Bracket



Code Word	No.	List per 100
<i>Caraway.</i>	1252—12 inches, Oak, Painted, Regular, 1-inch Top.....	\$2 70
<i>Career.</i>	7687—12 " " " Extra Heavy, 1-inch Top.....	4 00

Iron Side Brackets



No. 7688



No. 1254



No. 1253

THE threaded portions of these Brackets are 1 inch in diameter. The No. 7688 is intended for telephone or light feeder wires, and Nos. 1254 and 1253 will carry the largest sizes of feeder wire. The No. 1253 has a curved back designed for use on poles, while the Nos. 7688 and 1254 have straight backs.

Code Word	No.	List per 100
<i>Caress.</i>	7688—Side Bracket Small Size, Malleable Iron, Japanned.....	\$ 2 00
<i>Caribou.</i>	1254— " " Large " " " "	50 00
<i>Carnival.</i>	1253— " " " " " " " "	51 25

Pole Step



Regular

Code Word	No.	List per 100
<i>Carotic.</i>	1247—Pole Step, $\frac{9}{16}$ x 9 inches, Galvanized.....	\$6 30

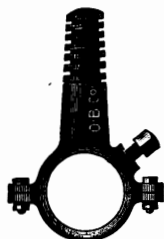
Duplex Iron Side Bracket



THIS Bracket is made of malleable iron and allows a vertical separation between the two wires of approximately 10 inches. It is designed for telephone and light feeder wires. The diameter of the tops of the threaded portions is 1 inch.

Code Word	No.	List per 100
<i>Carousal.</i>	4460—Side Bracket.....	\$95 00

Pole Bracket Pin

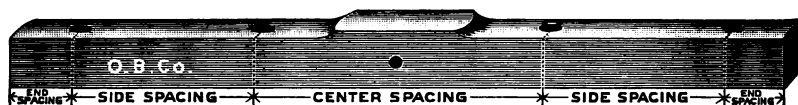


THIS is a standard size Iron Pin with split collar, adapted to attach to pole brackets for carrying feeder wires. It is made of malleable iron, and the threaded portion is 1 inch in diameter at the top.

Code Word	No.	List per 100
<i>Carpal.</i>	1255—Pin for $1\frac{1}{4}$ in. Pipe ($1\frac{1}{4}$ in. outside diameter)	\$50 00
<i>Carpel.</i>	1256— " " $1\frac{1}{2}$ " " ($1\frac{3}{8}$ " " ")	52 50
<i>Carler.</i>	1257— " " 2 " " ($2\frac{3}{8}$ " " ")	51 25

Standard Cross Arms

Yellow Pine



$3\frac{1}{2} \times 4\frac{1}{4}$ Inches, $1\frac{1}{2}$ -Inch Holes

THESE Cross Arms are regularly furnished painted with two coats of preservative paint and bored for one $\frac{5}{8}$ -inch machine bolt. Borings for pins are standard unless otherwise ordered.

Code Word	No.	Length Feet	Number of Pins	Spacings			Weight Pounds	List per 100
				End Inches	Center Inches	Side Inches		
<i>Cartoon.</i>	8601	3	2	4	28	..	12	\$37 50
<i>Carver.</i>	8602	4	4	4	16	12	16	50 00
<i>Casement.</i>	8603	5	4	4	18	17	20	62 50
<i>Cashmere.</i>	8604	6	4	4	22	21	24	75 00
<i>Castle.</i>	8605	6	6	4	16	12	24	75 00

Cross Arm Braces



THE sizes listed below are regularly furnished with a hole at each end, $\frac{7}{8}$ inch and $\frac{5}{8}$ inch in diameter, respectively. They can be supplied with special sizes of holes to order.

Code Word	No.	Length	over all	20 inches,	1 x $\frac{3}{16}$ -inch Iron,	Plain.....	List per 100
<i>Casual.</i>	7679	—	“	20	“	Galvanized..	\$ 6 50
<i>Catacomb.</i>	2632	—	“	20	“	Galvanized..	9 05
<i>Catalpa.</i>	7680	—	“	24	“	Plain.....	10 75
<i>Cataract.</i>	2633	—	“	24	“	Galvanized..	14 35
<i>Catcher.</i>	7681	—	“	26	“	Plain.....	11 70
<i>Catagory.</i>	2635	—	“	26	“	Galvanized..	15 50
<i>Caterer.</i>	7682	—	“	28	“	Plain.....	12 60
<i>Catfish.</i>	4454	—	“	28	“	Galvanized..	16 70

Cone Point Lag Screws



Plain Finish

Code Word	No.		List per 100
<i>Caucus.</i>	1241— $\frac{1}{8}$	x 2 inches.....	\$ 2 45
<i>Caustic.</i>	1242— $\frac{1}{8}$	x 3 ".....	2 85
<i>Cavalier.</i>	7651— $\frac{3}{8}$	x 2 ".....	2 96
<i>Cavalry.</i>	7652— $\frac{3}{8}$	x 2 $\frac{1}{2}$ ".....	3 22
<i>Caveator.</i>	2623— $\frac{3}{8}$	x 3 ".....	3 48
<i>Cavern.</i>	2624— $\frac{3}{8}$	x 4 ".....	4 00
<i>Cavity.</i>	2625— $\frac{1}{8}$	x 3 ".....	4 11
<i>Celature.</i>	2626— $\frac{1}{8}$	x 4 ".....	4 75
<i>Celery.</i>	4411— $\frac{1}{8}$	x 5 ".....	5 39
<i>Cellar.</i>	7653— $\frac{1}{2}$	x 2 $\frac{1}{2}$ ".....	4 47
<i>Cemental.</i>	4412— $\frac{1}{2}$	x 3 ".....	4 83
<i>Cenatory.</i>	7654— $\frac{1}{2}$	x 3 $\frac{1}{2}$ ".....	5 19
<i>Cenotaph.</i>	2627— $\frac{1}{2}$	x 4 ".....	5 55
<i>Censer.</i>	4413— $\frac{1}{2}$	x 5 ".....	6 27
<i>Censual.</i>	1243— $\frac{1}{2}$	x 6 ".....	6 99
<i>Census.</i>	1244— $\frac{1}{2}$	x 7 ".....	7 71
<i>Century.</i>	1245— $\frac{1}{2}$	x 8 ".....	8 43

Galvanized Finish

<i>Cerated.</i>	4414— $\frac{1}{8}$	x 2 inches.....	\$ 3 27
<i>Cereal.</i>	4415— $\frac{1}{8}$	x 3 ".....	3 80
<i>Cerebral.</i>	7655— $\frac{3}{8}$	x 2 ".....	3 95
<i>Ceremony.</i>	7656— $\frac{3}{8}$	x 2 $\frac{1}{2}$ ".....	4 30
<i>Chajer.</i>	4416— $\frac{3}{8}$	x 3 ".....	4 64
<i>Chagrin.</i>	4417— $\frac{3}{8}$	x 4 ".....	5 34
<i>Chaise.</i>	4418— $\frac{1}{8}$	x 3 ".....	5 48
<i>Chalky.</i>	4419— $\frac{1}{8}$	x 4 ".....	6 34
<i>Chamois.</i>	4420— $\frac{1}{8}$	x 5 ".....	7 19
<i>Champion.</i>	7657— $\frac{1}{2}$	x 2 $\frac{1}{2}$ ".....	5 96
<i>Chanter.</i>	4421— $\frac{1}{2}$	x 3 ".....	6 44
<i>Chapel.</i>	7658— $\frac{1}{2}$	x 3 $\frac{1}{2}$ ".....	6 92
<i>Chaperon.</i>	4422— $\frac{1}{2}$	x 4 ".....	7 40
<i>Chapter.</i>	4423— $\frac{1}{2}$	x 5 ".....	8 36
<i>Chariot.</i>	4424— $\frac{1}{2}$	x 6 ".....	9 32
<i>Charmer.</i>	4425— $\frac{1}{2}$	x 7 ".....	10 28
<i>Charming.</i>	4426— $\frac{1}{2}$	x 8 ".....	11 24

Standard sizes not listed above furnished promptly.

Standard Machine Bolts

With Square Heads and Nuts



On Standard Machine Bolts the length of thread is approximately three times the diameter. These Bolts can also be furnished to order with a longer thread than standard.

Code Word	No.	Plain Finish	List per 100	Code Word	No.	Galvanized Finish	List per 100
<i>Chasen.</i>	7637	$\frac{1}{4}$ x 1 in.	\$ 1 70	<i>Citadel.</i>	7644	$\frac{1}{4}$ x 1 in.	\$ 2 26
<i>Chastise.</i>	7638	$\frac{1}{4}$ x $1\frac{1}{4}$ "	1 70	<i>Citified.</i>	7645	$\frac{1}{4}$ x $1\frac{1}{4}$ "	2 26
<i>Chastity.</i>	7639	$\frac{1}{4}$ x $1\frac{1}{2}$ "	2 40	<i>Citizen.</i>	7646	$\frac{1}{4}$ x $1\frac{1}{2}$ "	3 20
<i>Chatter.</i>	7640	$\frac{1}{4}$ x $1\frac{3}{4}$ "	2 40	<i>Citron.</i>	7647	$\frac{1}{4}$ x $1\frac{3}{4}$ "	3 20
<i>Chaunter.</i>	4357	$\frac{1}{4}$ x 2 "	2 56	<i>Civilize.</i>	4381	$\frac{1}{4}$ x 2 "	3 41
<i>Checker.</i>	4359	$\frac{1}{4}$ x 3 "	2 88	<i>Claimer.</i>	4383	$\frac{1}{4}$ x 3 "	3 84
<i>Cheerful.</i>	4360	$\frac{1}{4}$ x 2 "	3 00	<i>Clammy.</i>	4384	$\frac{1}{4}$ x 2 "	4 00
<i>Cheese.</i>	7641	$\frac{1}{4}$ x $1\frac{1}{2}$ "	3 60	<i>Clamor.</i>	7648	$\frac{1}{4}$ x $1\frac{1}{2}$ "	4 80
<i>Cherish.</i>	4363	$\frac{1}{4}$ x 2 "	3 86	<i>Clapper.</i>	4387	$\frac{1}{4}$ x 2 "	5 14
<i>Cherry.</i>	4364	$\frac{1}{4}$ x $2\frac{1}{2}$ "	4 12	<i>Clarify.</i>	4388	$\frac{1}{4}$ x $2\frac{1}{2}$ "	5 49
<i>Chestnut.</i>	4365	$\frac{1}{4}$ x 3 "	4 38	<i>Classic.</i>	4389	$\frac{1}{4}$ x 3 "	5 84
<i>Cheviot.</i>	4366	$\frac{1}{4}$ x 4 "	4 90	<i>Clatter.</i>	4390	$\frac{1}{4}$ x 4 "	6 53
<i>Chilled.</i>	4368	$\frac{1}{4}$ x 6 "	5 94	<i>Claudent.</i>	4392	$\frac{1}{4}$ x 6 "	7 92
<i>Chimney.</i>	4369	$\frac{1}{4}$ x 8 "	6 98	<i>Claver.</i>	4393	$\frac{1}{4}$ x 8 "	9 30
<i>Chitter.</i>	4370	$\frac{1}{4}$ x 10 "	8 02	<i>Clayish.</i>	4394	$\frac{1}{4}$ x 10 "	10 69
<i>Chivalry.</i>	4371	$\frac{1}{4}$ x 12 "	9 06	<i>Cleaner.</i>	4395	$\frac{1}{4}$ x 12 "	12 08
<i>Choker.</i>	4375	$\frac{1}{4}$ x 4 "	7 10	<i>Cleanly.</i>	4399	$\frac{1}{4}$ x 4 "	9 46
<i>Chorus.</i>	4377	$\frac{1}{4}$ x 6 "	8 62	<i>Cleavage.</i>	4401	$\frac{1}{4}$ x 6 "	11 49
<i>Chuckie.</i>	4378	$\frac{1}{4}$ x 8 "	10 14	<i>Cleave.</i>	4402	$\frac{1}{4}$ x 8 "	13 52
<i>Chunky.</i>	4379	$\frac{1}{4}$ x 10 "	11 66	<i>Clematis.</i>	4403	$\frac{1}{4}$ x 10 "	15 54
<i>Church.</i>	7642	$\frac{1}{4}$ x 11 "	12 42	<i>Clemency.</i>	7649	$\frac{1}{4}$ x 11 "	16 56
<i>Churning.</i>	4380	$\frac{1}{4}$ x 12 "	13 18	<i>Clement.</i>	4404	$\frac{1}{4}$ x 12 "	17 57
<i>Cinder.</i>	7643	$\frac{1}{4}$ x 14 "	14 70	<i>Clergy.</i>	7650	$\frac{1}{4}$ x 14 "	19 60
<i>Cinnamon.</i>	9544	$\frac{1}{4}$ x 12 "	17 70	<i>Clerical.</i>	9547	$\frac{1}{4}$ x 12 "	23 60
<i>Circlet.</i>	9545	$\frac{1}{4}$ x 14 "	19 70	<i>Clever.</i>	9548	$\frac{1}{4}$ x 14 "	26 26
<i>Circus.</i>	9546	$\frac{1}{4}$ x 16 "	21 70	<i>Client.</i>	9549	$\frac{1}{4}$ x 16 "	28 94

Standard sizes not listed above furnished promptly.

Can furnish with hexagonal Nuts at 10 per cent net additional.

Common Carriage Bolts



The length of thread on Carriage Bolts is approximately three times the diameter.

Code Word	No.	Plain Finish	List per 100	Code Word	No.	Galvanized Finish	List per 100
<i>Cliffy.</i>	4427	$\frac{3}{8}$ x 4 in.	\$2 40	<i>Clouding.</i>	4439	$\frac{3}{8}$ x 4 in.	\$3 20
<i>Clifted.</i>	7661	$\frac{1}{2}$ x 4 $\frac{1}{2}$ "	2 56	<i>Cloudy.</i>	7664	$\frac{3}{8}$ x 4 $\frac{1}{2}$ "	3 41
<i>Climbing.</i>	4428	$\frac{1}{2}$ x 5 "	2 72	<i>Clover.</i>	4440	$\frac{3}{8}$ x 5 "	3 62
<i>Clinker.</i>	4429	$\frac{1}{2}$ x 6 "	3 04	<i>Clownage.</i>	4441	$\frac{3}{8}$ x 6 "	4 05
<i>Clipper.</i>	4433	$\frac{1}{2}$ x 4 "	3 66	<i>Clubbed.</i>	4445	$\frac{1}{2}$ x 4 "	4 88
<i>Cloddish.</i>	4434	$\frac{1}{2}$ x 5 "	4 10	<i>Clucking.</i>	4446	$\frac{1}{2}$ x 5 "	5 97
<i>Cloggy.</i>	4435	$\frac{1}{2}$ x 6 "	4 54	<i>Clumsily.</i>	4447	$\frac{1}{2}$ x 6 "	6 05
<i>Closter.</i>	4436	$\frac{1}{2}$ x 8 "	5 42	<i>Clumsy.</i>	4448	$\frac{1}{2}$ x 8 "	7 23
<i>Closure.</i>	7662	$\frac{1}{2}$ x 9 "	5 86	<i>Clutter.</i>	7665	$\frac{1}{2}$ x 9 "	7 81
<i>Clothe.</i>	4437	$\frac{1}{2}$ x 10 "	6 30	<i>Coachman.</i>	4449	$\frac{1}{2}$ x 10 "	8 40
<i>Clothing.</i>	7663	$\frac{1}{2}$ x 11 "	6 74	<i>Coaction.</i>	7666	$\frac{1}{2}$ x 11 "	8 98
<i>Clotted.</i>	4438	$\frac{1}{2}$ x 12 "	7 18	<i>Coalite.</i>	4450	$\frac{1}{2}$ x 12 "	9 57

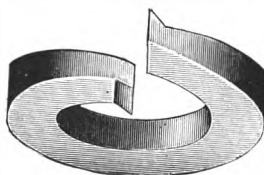
Standard sizes not listed above furnished promptly.

Square Iron Washers



Code Word	No.	Finish	Size	Thickness	To Fit Bolt	List per 1000
<i>Coasting.</i>	7667	Plain	1 $\frac{1}{2}$ inch sq.	$\frac{1}{8}$ inch	$\frac{1}{2}$ inch	\$11 30
<i>Coatless.</i>	7668	Galv.	1 $\frac{1}{2}$ " "	$\frac{1}{8}$ "	"	16 38
<i>Coaxer.</i>	9569	Plain	2 " "	$\frac{1}{8}$ "	"	19 25
<i>Cobweb.</i>	9570	Galv.	2 " "	$\frac{1}{8}$ "	"	26 25
<i>Cockade.</i>	9550	Plain	2 " "	$\frac{1}{8}$ "	"	19 25
<i>Codifier.</i>	9551	Galv.	2 " "	$\frac{1}{8}$ "	"	26 25
<i>Coerce.</i>	7671	Plain	2 $\frac{1}{4}$ " "	$\frac{3}{16}$ "	"	22 62
<i>Coercion.</i>	7672	Galv.	2 $\frac{1}{4}$ " "	$\frac{3}{16}$ "	"	29 62
<i>Coffee.</i>	9552	Plain	2 $\frac{1}{4}$ " "	$\frac{3}{16}$ "	"	22 62
<i>Cogeneity.</i>	9553	Galv.	2 $\frac{1}{4}$ " "	$\frac{3}{16}$ "	"	29 62

Positive Lock Washer



THE body of this Washer carries the load of compression, and the spring is not affected by continued use. When subject to vibration or jarring, the engaging points on the Washer embed themselves more firmly in the surfaces against which they bear and form a positive lock. It is reversible and does not injure the bolt or other parts with which it is assembled. Its utility is not impaired by using many times.

Code Word	No.	Diameter of Bolt	Size of Steel		List per 1000
			Thickness	Width	
<i>Cogitate.</i>	9541	$\frac{3}{8}$ inch	$\frac{1}{8}$ inch	$\frac{3}{16}$ inch	\$11 30
<i>Cognomen.</i>	5034	$\frac{1}{2}$ "	$\frac{3}{16}$ "	$\frac{3}{16}$ "	11 90
<i>Cohesion.</i>	5035	$\frac{1}{2}$ "	$\frac{1}{16}$ "	$\frac{1}{4}$ "	12 00
<i>Coinage.</i>	5036	$\frac{3}{8}$ "	$\frac{1}{16}$ "	$\frac{1}{4}$ "	12 30
<i>Coiner.</i>	5037	$\frac{3}{8}$ "	$\frac{3}{16}$ "	$\frac{1}{4}$ "	12 60
<i>Colander.</i>	5038	$\frac{3}{4}$ "	$\frac{1}{16}$ "	$\frac{1}{4}$ "	12 70
<i>Coldish.</i>	5039	$\frac{1}{2}$ "	$\frac{1}{4}$ "	$\frac{3}{16}$ "	14 80
<i>Collapse.</i>	5040	1 "	$\frac{1}{4}$ "	$\frac{3}{8}$ "	19 90

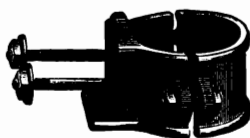
Round Iron Washer



Code Word	No.	Finish	Outside Diameter	To Fit Bolt	List per 1000
<i>College.</i>	7659	1 Lin	$\frac{3}{8}$ inch	$\frac{1}{4}$ inch	\$ 1 95
<i>Collide.</i>	7660	Galv.	$\frac{3}{8}$ "	$\frac{1}{4}$ "	2 62
<i>Colloid.</i>	2628	Plain	$\frac{1}{2}$ "	$\frac{3}{8}$ "	2 10
<i>Colloquy.</i>	4405	Galv.	$\frac{1}{2}$ "	$\frac{1}{2}$ "	2 75
<i>Collude.</i>	2629	Plain	1 "	$\frac{3}{8}$ "	3 02
<i>Cologne.</i>	4406	Galv.	1 "	$\frac{3}{8}$ "	4 07
<i>Colonel.</i>	2630	Plain	$1\frac{1}{4}$ "	$\frac{1}{2}$ "	4 07
<i>Colonial.</i>	4407	Galv.	$1\frac{1}{4}$ "	$\frac{1}{2}$ "	5 05
<i>Colonist.</i>	2631	Plain	$1\frac{1}{2}$ "	$\frac{1}{2}$ "	5 82
<i>Colonize.</i>	4408	Galv.	$1\frac{1}{2}$ "	$\frac{1}{2}$ "	7 45
<i>Colorist.</i>	4409	Plain	$1\frac{3}{4}$ "	$\frac{1}{2}$ "	11 37
<i>Colossus.</i>	4410	Galv.	1 "	$\frac{1}{2}$ "	13 67
<i>Columbic.</i>	9542	Plain	2 "	$\frac{1}{2}$ "	22 20
<i>Combat.</i>	9543	Galv.	2 "	$\frac{1}{2}$ "	26 70

Wood Cross Arm Supports

For Iron Poles



USED for attaching standard size wood cross arms to iron poles. The cross arms are secured to the Supports by the two $\frac{1}{2}$ -inch bolts shown, which pass through them and clamp them in place by means of a nut and washer on their outer ends. These Supports are made of malleable iron.

Code Word	No.	List per 100
<i>Combat.</i>	2641—Single Support for 4-in. Pole ($4\frac{1}{2}$ in. outside diameter).....	\$155 00
<i>Combing.</i>	2643— “ “ “ 5 “ ($5\frac{9}{16}$ “ “)....	155 00
<i>Combust.</i>	2644— “ “ “ 6 “ ($6\frac{5}{8}$ “ “)....	195 00

In ordering Cross Arm Supports observe that the Pole diameters as listed are “Pipe Measurements.”

Anchor or Guy Rods

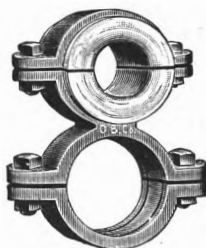


THESE Rods are furnished complete with nut and square iron washer, size 4 x 4 x $\frac{1}{4}$ inches.

Code Word	No.	List per 100
<i>Comedian.</i>	4222—Anchor Rod, $\frac{5}{8}$ inch x 6 feet, Plain.....	\$ 63 00
<i>Comedy.</i>	4223— “ “ $\frac{5}{8}$ “ x 6 “ Galvanized.....	83 00
<i>Cometary.</i>	4224— “ “ $\frac{5}{8}$ “ x 8 “ Plain.....	83 00
<i>Comfort.</i>	4225— “ “ $\frac{5}{8}$ “ x 8 “ Galvanized.....	105 00
<i>Commatic.</i>	4226— “ “ $\frac{3}{4}$ “ x 6 “ Plain.....	88 00
<i>Commix.</i>	4227— “ “ $\frac{3}{4}$ “ x 6 “ Galvanized.....	121 00
<i>Commode.</i>	4228— “ “ $\frac{3}{4}$ “ x 8 “ Plain.....	116 00
<i>Communal.</i>	4229— “ “ $\frac{3}{4}$ “ x 8 “ Galvanized.....	152 00
<i>Compact.</i>	7565— “ “ 1 “ x10 “ Plain.....	210 00
<i>Comparer.</i>	7566— “ “ 1 “ x10 “ Galvanized.....	278 00

Feed-In Insulator

For Pole Brackets



FOR use on pole bracket construction to support and insulate the tap wire running from the feeder to the trolley wire. The insulation is opalescent glass with an opening 1 inch in diameter.

Code Word	No.	List per 100
<i>Compile.</i>	4462—Insulator for 1½-inch Pipe (1¾-inch outside diameter).....	\$92 00
<i>Compass.</i>	4463—“ “ 2 “ “ (2¾ “ “ “).....	95 00

Wooden Tree Insulator

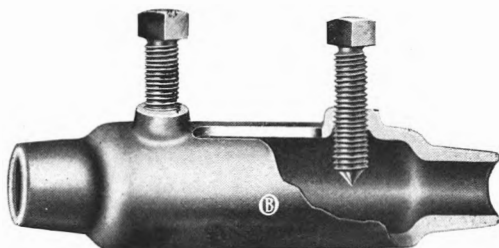


MADE in halves of seasoned hard wood, hollowed out in the center to fit over the wire, and saturated with an insulating compound.

Code Word	No.	List per 100
<i>Compile.</i>	2600—Tree Insulator, 12 inches long, ¾-inch hole.....	\$22 00
<i>Complice.</i>	2601—“ “ 18 “ “ ¾ “ “	35 00
<i>Complot.</i>	2603—“ “ 18 “ “ ¾ “ “	35 00
<i>Compone.</i>	2605—“ “ 18 “ “ ¾ “ “	35 00
<i>Comport.</i>	2607—“ “ 18 “ “ 1 “ “	35 00
<i>Composer.</i>	2609—“ “ 18 “ “ 1½ “ “	40 00

Feeder Wire Splicer

For Stranded Copper Wire



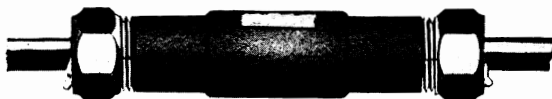
THIS Splicer consists of a special high-strength bronze sleeve with an enlarged recess at the center. The cable ends are inserted and butted together at the center of the Splicer and the two heavy set-screws are forced through the strands, spreading them out within the enlarged center recess. The Splicer is then completely filled with solder, making an absolutely perfect splice, both electrically and mechanically, the bent wire ends being so firmly imbedded in the solder that the cable will break rather than pull out of the sleeve when properly installed.

The Splicer is tinned all over and can be quickly and easily installed.

Code Word	No.		List per 100
<i>Flippant.</i>	10489—	Splicer for 250,000 and 300,000 C. M. Stranded Cable...	\$190 00
<i>Flitter.</i>	10490—	" " 350,000 C. M. Stranded Cable.....	195 00
<i>Flitting.</i>	10491—	" " 400,000 " " ".....	195 00
<i>Flobert.</i>	10492—	" " 500,000 " " ".....	250 00
<i>Flogger.</i>	10493—	" " 800,000 " " ".....	300 00
<i>Flooder.</i>	10494—	" " 1,000,000 " " ".....	300 00

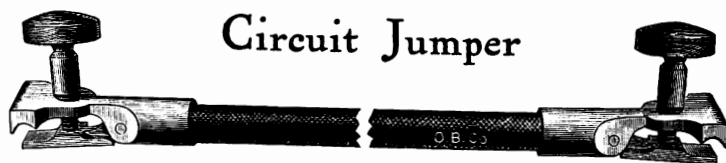
Feeder Wire Splicer

For Solid and Stranded Copper Wire



THIS Splicer is made of bronze and consists of two pieces which are in duplicate of each other, with the exception that one is slotted to permit solder being poured through it. These are clamped together and over the ends of the wires by means of two nuts threaded on to their ends. The inside of the central portion of the Splicer is somewhat larger than the wire, which allows a quantity of solder being placed there, thus insuring a perfect electrical and mechanical connection. Where this device is used for splicing Solid Wires, a stronger joint will be obtained if the wires to be joined are headed on their ends before being placed in the Splicer. For this purpose a Heading Tool is employed, which, in connection with an ordinary hammer, makes the operation a quick and easy one.

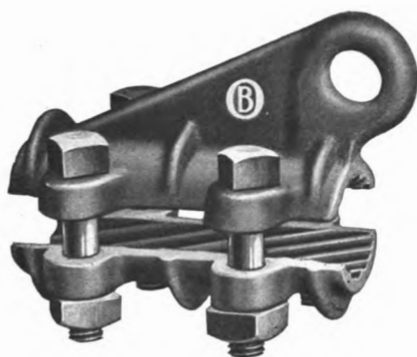
Code Word	No.	List per 100
<i>Floriage.</i>	2100—Splicer for No. 0 Stranded and 2-0 Solid Wires.....	\$140 00
<i>Floral.</i>	2099— “ “ “ 0 Solid Wire.....	145 00
<i>Florist.</i>	1201— “ “ “ 2-0 Stranded and 3-0 Solid Wires.....	182 00
<i>Flotant.</i>	1202— “ “ “ 3-0 “ “ 4-0 “ “.....	187 00
<i>Flounce.</i>	1203— “ “ “ 4-0 “ Wire.....	185 00
<i>Flounder.</i>	2111—Heading Tool for Solid Wire.....	275 00



THE insulated cable is equal to No. 4-0 B. & S. gauge and is 24 inches long; to either end of this are attached hinged brass clamps, with insulated handles, which will fit on wires from Nos. 0 to 4-0 B. & S. gauge.

Code Word	No.	List Each
<i>Conquer.</i>	2591—Circuit Jumper.....	\$4 25

Mechanical Feeder Wire Strain Clamp



THE Cable Clamp shown above was designed for the purpose of reducing the number of Clamps required to cover the range of sizes of feeder wire usually required in feeder systems, as well as to have a higher holding power than those generally used in the past.

Each half of the Clamp has spiral grooves which correspond to the arrangement of the cable strands. These spiral grooves are arranged for cable whose outer strands are wound right hand, but in case of the outer strands being wound left hand the number of friction points is so great that ample holding strength is insured without tearing of the strands.

This Clamp is made for two sizes of cable ranging from 4-0 B. & S. to 1,000,000 C. M. stranded wire as listed below.

In order to secure high mechanical strength without excessive weight, the Clamp is made of malleable iron.

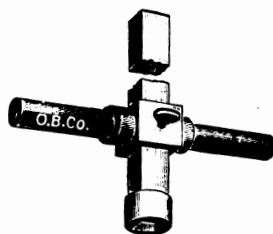
Code Word	No.	List per 100
<i>Fluster.</i>	10571—Clamp for No. 4-0 B. & S. to 400,000 C. M. Stranded Cable, inclusive.....	\$250 00
<i>Fluted.</i>	10572—Clamp for 500,000 to 1,000,000 C. M. Stranded Cable, inclusive.....	275 00

Stombaugh Guy Anchor

Type B Improved



5, 6 and 7-Inch
Anchor



Wrench
for Setting 5, 6 and 7-Inch Anchors



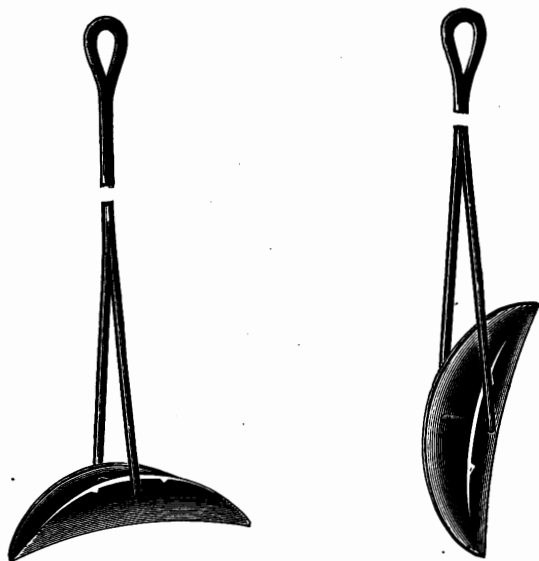
8-Inch Anchor

IN installing the smaller sizes of this Anchor up to 8 inches, it is necessary to use a wrench, as the cross-section of the rods is not sufficiently great to stand the twisting strain. With the larger sizes an iron or wood bar may be placed through the eye of the Anchor, to use as a handle in screwing it into the ground.

Code Word	No.	Diameter of Blade	Size of Rod	Approx. Holding Power in lbs.	Weight lbs.	List Each
<i>Cordial.</i>	9475	5 inches	6 feet x $\frac{1}{4}$ -in. Round	12,500	6 $\frac{1}{2}$	\$1 15
<i>Cornage.</i>	9476	6 "	6 " x " "	15,000	10	2 25
<i>Corner.</i>	9477	7 "	6 " x " "	17,500	12	4 50
<i>Cornice.</i>	9478	8 "	6 " x 1 $\frac{1}{4}$ " Square	20,000	38	7 50

Corrolla. 9481—Wrench for 5 and 6-inch Anchors, weight 18 pounds.....\$5 10
Corona. 9482— " " 7-inch " " 20 " 6 50

Miller Guy Anchor



THE Miller Guy Anchor is used for guying electric railway, light and telephone poles. It is low in price, easily and quickly installed, and "never pulls up." When properly set in dry clay soil it is impossible to pull up these Anchors without first breaking the rods. The blade of the Anchor is made of cast iron and the rods of wrought iron.

Code Word	No.	Size of Anchor Inches	Area of Anchor	Diameter of Rod Inches	Length of Rod Feet	List Each
<i>Coroner.</i>	8592	10 x 5	Equals a 7-inch Circle	$\frac{1}{2}$	6	\$0 60
<i>Corporal.</i>	8593	13 x 6	" 9 " "	$\frac{3}{4}$	7	80
<i>Corrupt.</i>	8594	16 x 7	" 12 " "	$\frac{7}{8}$	7	1 25
<i>Cosmetic.</i>	8595	19 x 8	" 14 " "	1	8	2 25

Miller Guy Anchor Tools

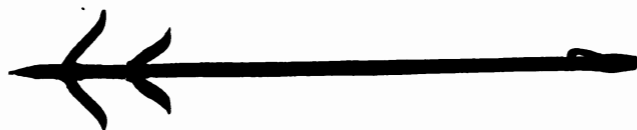
THE small Standard Auger has a 7-foot stem and is suitable for installing the No. 8592 Anchor, and the large Standard has a 9-foot stem and is used for the Nos. 8593 to 8595 Anchors.

Code Word	No.	List Each
<i>Costume.</i>	8597—Small Standard Auger, for setting Anchor No. 8592.....	\$2 50
<i>Cottage.</i>	8598—Large " " " " " " 8593-8595...	3 00
<i>Courage.</i>	9506—Hollow Stem Tamping Bar, 1 $\frac{5}{8}$ in. x 9 feet, with Cutter and Round Tamping Heads.....	1 50
<i>Flinders</i>	10474—Auger Deflector.....	3 00

Harpoon Guy Anchor



Anchor Closed



Anchor Open

THIS Anchor consists of an iron rod 5 feet long and 1 inch square with four wings at the lower end. It is installed by driving the rod its full length into the ground with a sledge hammer, no digging being necessary.

The guy wire is then attached to the ring in the end of the rod, and as the guy is tightened the wings of the Anchor will spread and set the Anchor.

Code Word	No.	List Each
<i>Crackle.</i>	10456—Harpoon Guy Anchor, Black Enamel Finish.....	\$1 45
<i>Craftily.</i>	10457— " " " Galvanized.....	1 65

Galvanized Steel Wire Strand



Regular Grade—Single Galvanized

Code Word	No.	7 Wires	Diameter in Inches	Weight in Pounds per 100 Feet	Approximate Breaking Strain in Pounds	List per 100 Feet
<i>Craggy.</i>	1190	No. 15	$\frac{1}{4}$	13	2500	\$1 75
<i>Cranium.</i>	1191	" 12	$\frac{5}{16}$	22	4200	2 25
<i>Crater.</i>	1192	" 11	$\frac{3}{8}$	30	5700	2 75
<i>Create.</i>	2572	" 10	$\frac{7}{16}$	40	7600	3 75
<i>Credence.</i>	2573	" 8	$\frac{1}{2}$	52	9800	4 50

Regular Grade—Double or Extra Galvanized

Code Word	No.	7 Wires	Diameter in Inches	Weight in Pounds per 100 Feet	Approximate Breaking Strain in Pounds	List per 100 Feet
<i>Crescent.</i>	7807	No. 15	$\frac{1}{4}$	13	2500	\$1 75
<i>Cribbage.</i>	7808	" 12	$\frac{5}{16}$	22	4200	2 25
<i>Crimson.</i>	7809	" 11	$\frac{3}{8}$	30	5700	2 75
<i>Cringe.</i>	7810	" 10	$\frac{7}{16}$	40	7600	3 75
<i>Critical.</i>	7811	" 8	$\frac{1}{2}$	52	9800	4 50

Siemens-Martin—Double Galvanized

Code Word	No.	7 Wires	Diameter in Inches	Weight in Pounds per 100 Feet	Approximate Breaking Strain in Pounds	List per 100 Feet
<i>Crochet.</i>	10280	No. 15	$\frac{1}{4}$	13	3050	\$0 90
<i>Crowned.</i>	10281	" 12	$\frac{5}{16}$	22	4860	2 10
<i>Cruelly.</i>	10282	" 11	$\frac{3}{8}$	30	6800	2 70
<i>Cruiser.</i>	10283	" 10	$\frac{7}{16}$	40	9000	3 45
<i>Crusade.</i>	10284	" 8	$\frac{1}{2}$	52	11000	3 95

Ohio Incandescent Lamps

Licensed Label



16 Candle Power, Edison Base Lamp

When ordering lamps always state style of base, voltage and wattage per candle power desired.

See following page for description and list.

Ohio Incandescent Lamps

WE claim that the Ohio Lamps will maintain their candle power, during the first 400 hours they burn, better than any other lamps on the market, owing to the superior filament which is used and the high degree of exhaustion obtained by the chemical process employed. In the appended list are included only those candle powers in the standard types which are most generally used, but we are prepared to furnish on short notice other sizes, designs and finishes regularly made.

For electric traction service this Lamp is made with a special anchored filament to withstand the jars and vibrations due to the jolting it receives in service, as well as the fluctuations of voltage on the line. It is tested with especial care for uniform voltage and wattage.

Code Word	No.	List per 100
<i>Crusher.</i>	10461—Edison Base Lamp, 8 C. P., 20 to 99 Volts.....	\$22 00
<i>Crystal.</i>	10462— " " " 8 " 100 " 130 "	20 00
<i>Cudgel.</i>	10463— " " " 8 " 200 " 260 "	22 00
<i>Culinary.</i>	10464— " " " 16 " 20 " 99 "	22 00
<i>Culpable.</i>	10465— " " " 16 " 100 " 130 "	20 00
<i>Culture.</i>	10466— " " " 16 " 200 " 260 "	22 00
<i>Cunning.</i>	10467— " " " 32 " 20 " 99 "	40 00
<i>Curator.</i>	10468— " " " 32 " 100 " 130 "	30 00
<i>Curdle.</i>	10469— " " " 32 " 200 " 260 "	40 00

When ordering Lamps be sure to specify exact voltage desired.

For Lamps with Thomson-Houston Bases add \$3.00 per 100 to the above list prices.

Standard packages for 8 and 16 Candle Power Lamps is 200; for 32 Candle Power Lamps, 100.

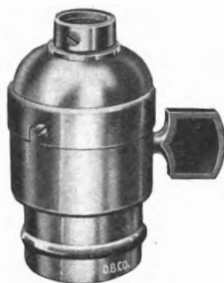
Standard packages may be made up from assorted candle powers and voltages.

Lamp Sockets

250 Volts



No. 1591



No. 1588



No. 9722

Code Word	No.	List per 100
<i>Curfew.</i>	1591—Keyless Socket, Edison Base, $\frac{1}{8}$ -inch Cap.....	\$30 00
<i>Curtail.</i>	1588—Key “ “ “ “ “ “	33 00
<i>Custody.</i>	9722— “ Wall “ “ “	40 00

All the above Sockets can be furnished with T. H. Base when so ordered.

Packed 10 in a paper box.

Weatherproof Sockets



No. 9573



No. 2879

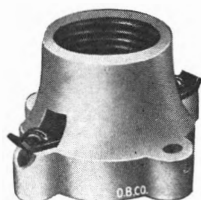


No. 2876

Code Word	No.	List per 100
<i>Cuticle.</i>	2879—Mica Socket, Edison Base.....	\$47 00
<i>Cyclone.</i>	9573—Porcelain Petticoat Socket, Edison Base.....	35 00
<i>Dabbler.</i>	2876— “ Socket, Edison Base.....	25 00

Porcelain Receptacle

250 Volt



Code Word
Daffodil.

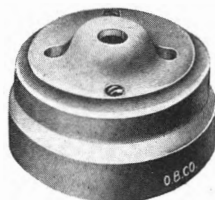
No.	List per 100
1603—Cleat Receptacle, Edison Base.....	\$16 00

Little Gem Rosettes

Fusible



No. 8301



No. 8302

Code Word
Daftness.
Dagger.

No.	List per 100
8301—Porcelain Rosette, Cleat Style.....	\$17 00
8302— " " Concealed Style.....	17 00

Porcelain Attachment Plug

Fusible

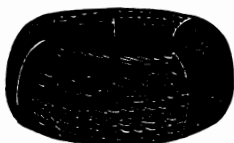


Code Word
Dainty.

No.	List per 100
6959—Attachment Plug, Edison Base, Fusible.....	\$20 00

Lamp Cord

Cotton Covered



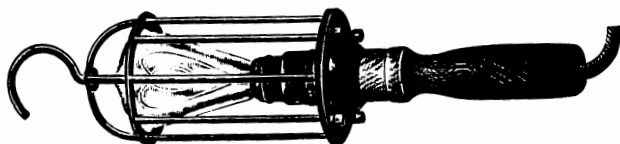
Code Word	No.	List per 100 Yards
<i>Damask.</i>	9576—National Code Std. No. 14 B. & S. $\frac{1}{8}$ -in. Rubber Insulation	\$24 00
<i>Dampen.</i>	9577—“ “ “ “ 16 “ $\frac{1}{8}$ “ “	16 00
<i>Damson.</i>	9578—“ “ “ “ 18 “ $\frac{1}{8}$ “ “	12 00

Socket Bushing



Code Word	No.	List per 100
<i>Danger.</i>	4780—Bushing, Hard Rubber, $\frac{1}{8}$ inch.	\$0 94

Portable Lamp Guard



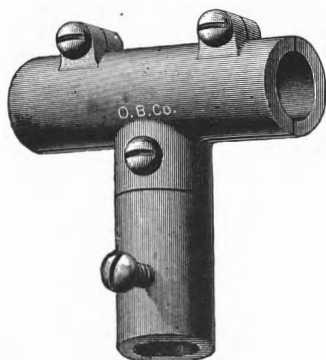
THIS Lamp Guard is fast coming into general use in carbarn pits, railroad yards, mines, etc.

It consists of a strong but light wire cage which is fastened to a wood handle by means of a bayonet-locking device, and the cage is provided with a hook of such size and shape as to enable the user to hang the lamp upon any available support, thus leaving both hands free to work.

The Lamp Guard as regularly furnished is copper plated and is fitted with a $\frac{3}{8}$ -inch Edison Base Socket.

Code Word	No.	List per 100
<i>Dareful.</i>	9514—Lamp Guard with Edison Base Socket	\$150 00

Tee Wire Connector

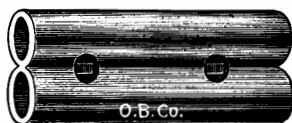


THE sizes given below refer to solid wire only. When ordering Connectors for use with stranded wire, always give the diameter of wire in inches.

Code Word	No.							List per 100
<i>Darken.</i>	4300—	Connector for No.	6	B. & S. Main Wire.				\$38 75
<i>Dashing.</i>	4301—	" " "	4	" " "				38 75
<i>Datable.</i>	4302—	" " "	2	" " "				52 50
<i>Dative.</i>	2592—	" " "	0	" " "				55 00
<i>Daunter.</i>	2593—	" " "	2-0	" " "				55 00
<i>Deafen.</i>	2594—	" " "	3-0	" " "				65 00
<i>Debate.</i>	2595—	" " "	4-0	" " "				65 00

In ordering Tee Connectors observe that the sizes of wires as listed are for the main wire, and the size of the branch wire desired should be specified.

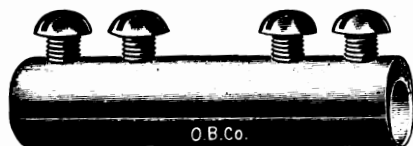
Soldered Connector



The ends of the wire are passed through the Connector, headed over and then soldered into it.

Code Word	No.							List per 100
<i>Decade.</i>	1206—	Connector for No.	0	B. & S. Wire, length $2\frac{1}{8}$ inches.				\$35 00
<i>Decanter.</i>	1207—	" " "	2-0	" " "	$2\frac{1}{8}$	"		37 50
<i>Decimal.</i>	1208—	" " "	3-0	" " "	$2\frac{1}{8}$	"		42 50
<i>Declaim.</i>	1209—	" " "	4-0	" " "	$2\frac{1}{8}$	"		45 00

Two-Way Wire Connector



Nos. 1214—4305

With Round-Head Screws

Code Word	No.							List per 100
<i>Dialect.</i>	1214—	Connector for No.	6 B. & S. Solid Wire,	length 2 inches	...	\$13	75	
<i>Dialogue.</i>	1213—	" " "	4 " "	" " "	2 " "	...	15	62
<i>Diamond.</i>	1212—	" " "	2 " "	" " "	2 " "	...	17	50
<i>Diction.</i>	1211—	" " "	0 " "	" " "	2 " "	...	21	25
<i>Digress.</i>	4303—	" " "	2-0 " "	" " "	2 " "	...	23	12
<i>Dilate.</i>	4304—	" " "	3-0 " "	" " "	2 " "	...	28	12
<i>Diluent.</i>	4305—	" " "	4-0 " "	" " "	2 " "	...	30	00

With Square-Head Screws

Code Word	No.							List per 100
<i>Diluter.</i>	4309—	Connector for No.	0 B. & S. Solid Wire,	length 2 inches	...	\$20	62	
<i>Dimity.</i>	4310—	" " "	2-0 " "	" " "	2 " "	...	21	25
<i>Dioxide.</i>	4311—	" " "	3-0 " "	" " "	2 " "	...	31	25
<i>Diploma.</i>	4312—	" " "	4-0 " "	" " "	2 " "	...	30	00

Twist Connectors

For Hard Drawn Copper Wire



Telephone Sizes

Code Word	No.							List per 100
<i>Direful.</i>	4297—	Connector for No.	10 B. & S. Solid Wire,	length 4½ inches	...	\$3	81	
<i>Disadorn.</i>	4298—	" " "	12 " "	" " "	4½ " "	...	6	88
<i>Disarray.</i>	4299—	" " "	14 " "	" " "	4 " "	...	6	50

"Diamond H" Switches

Single Pole Type

For 250-Volt Circuits



Code Word

Devest.

Devous.

No.

7872— 5 Amperes, Single Pole, with Dial, Open Base.....

List per 100

\$40 00

7874—10 " " " " " " " ".....

50 00

For 500-Volt Circuits



No. 7875

A description of this Switch is given on the opposite page. As regularly furnished it is intended for cleat work, the base being notched to receive side wires.

Code Word

Diadem.

No.

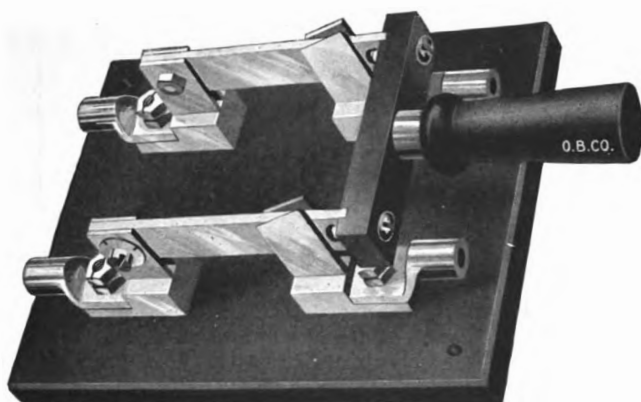
7876—5 Amperes, Single Pole, with Dial, Open Base.....

List per 100

\$50 00

Premier Knife Switches

For Circuits of 110—600 Volts



THE Premier Knife Switch is a strictly high grade switch in every respect, and similar in construction and appearance to the higher priced switches now on the market. It is thoroughly well made throughout, the blades and jaws being of cold rolled copper of generous proportions, and the base of selected slate with a black japanned finish. The Switch is neat in appearance, and in the "polished" form is suitable for the finest switchboard work. It is made in accordance with the requirements of the National Code. The Switches with fuse connections are regularly furnished for National Electrical Code Standard enclosed fuses.

See following page for lists.

Premier Knife Switches

For 110-600 Volt Circuits

Without Fuse Connections

Single Pole—Single Throw

Code Word	No.	Capacity in Amperes	Voltage	List Each
<i>Declinal.</i>	8451	25	110-250	\$ 0 70
<i>Decorum.</i>	8452	50	110-250	1 10
<i>Decoy.</i>	8454	100	110-250	2 00
<i>Dedicate.</i>	8456	200	110-250	3 80
<i>Deepen.</i>	8457	300	110-250	5 20
<i>Defame.</i>	8458	400	110-250	6 40
<i>Default.</i>	8460	600	110-250	8 70
<i>Defender.</i>	8511	25	350-600	88
<i>Dejorce.</i>	8512	50	350-600	1 38
<i>Dejtness.</i>	8514	100	350-600	2 50
<i>Delation.</i>	8516	200	350-600	4 75
<i>Delusion.</i>	8517	300	350-600	6 50
<i>Demerit.</i>	8518	400	350-600	8 00
<i>Denizen.</i>	8520	600	350-600	10 88

Double Pole—Single Throw

Code Word	No.	Capacity in Amperes	Voltage	List Each
<i>Denotate.</i>	8481	25	110-250	\$ 0 95
<i>Deplore.</i>	8482	50	110-250	1 65
<i>Depolish.</i>	8484	100	110-250	3 00
<i>Deponent.</i>	8486	200	110-250	5 70
<i>Deport.</i>	8487	300	110-250	7 80
<i>Deranger.</i>	8488	400	110-250	9 65
<i>Derelict.</i>	8490	600	110-250	13 10
<i>Deride.</i>	8541	25	350-600	1 20
<i>Derision.</i>	8542	50	350-600	2 06
<i>Derogate.</i>	8544	100	350-600	3 75
<i>Descend.</i>	8546	200	350-600	7 12
<i>Deserter.</i>	8547	300	350-600	9 75
<i>Desition.</i>	8548	400	350-600	12 06
<i>Desolate.</i>	8550	600	350-600	16 38

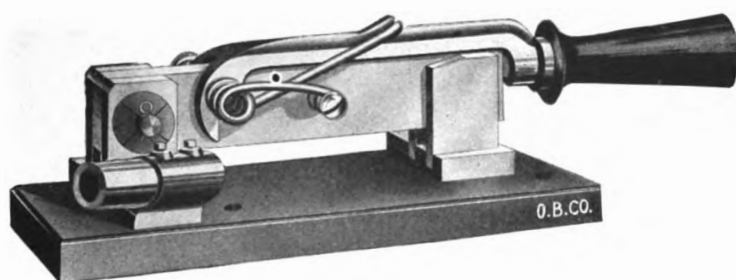
Premier Knife Switches can also be furnished with a capacity in amperes of 75, 500, 800, 1000, 1250, 1500 and 2000.

Any of the above Switches can be furnished with National Code Standard Fuse Holders, if desired, at an advanced price.

Standard Quick Break Switches

Patented

For Circuits of 110—600 Volts



THE Standard Quick Break Switch is undoubtedly the best switch of its kind ever offered at a reasonable price. It is of our own design and manufacture, and is constructed throughout of the best materials. Being of the quick break type, it is especially suitable for railway circuits, where a quick, wide break is necessary. It is positive in its action, and may be relied upon to open the circuit without any trouble up to, and beyond, its rated capacity. The blades and jaws are of hard, cold rolled copper, insuring a perfect contact, and the base of the Switch is of selected slate. It is furnished with front connections, as shown in the above illustration.

Single Pole

Code Word	No.	List Each
<i>Despend.</i>	7826— 100 Amperes, plain finish, not fused	\$7 50
<i>Despoil.</i>	7827— 200 " " " " " "	8 75
<i>Despot.</i>	7828— 300 " " " " " "	10 50
<i>Destinc.</i>	7829— 400 " " " " " "	11 62
<i>Desumc.</i>	7830— 600 " " " " " "	13 62
<i>Detent.</i>	7831— 800 " " " " " "	17 62
<i>Detract.</i>	7832—1000 " " " " " "	21 88

All prices are for "Plain" finish; for Polished finish, add 30 per cent.
to above list prices.

Line Section Switch

Patented

For Circuits of 110-600 Volts

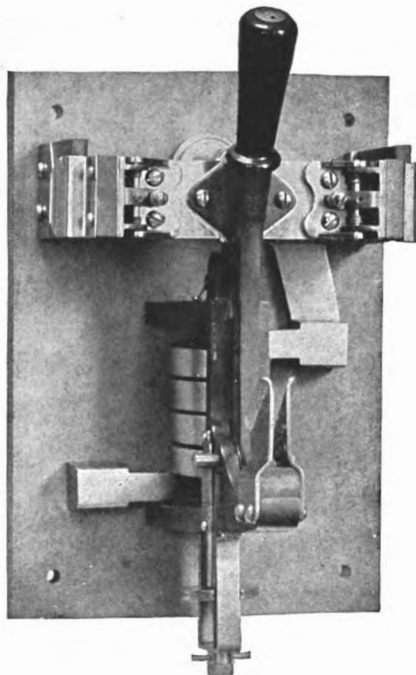


THE improved form of Line Section Switch which is shown in the above cut is of the Quick Break type, single pole, and is mounted on a slate base and enclosed with a wooden cover. The movable side of the Switch is connected to the trolley wire and is so constructed that even when it is open the door can be closed and fastened, thus preventing any interference with the line by an inexperienced person.

Code Word	No.	List Each
<i>Disband</i>	9537—Switch complete, 100 Amperes, not Fused.	\$ 8 25
<i>Disclaim.</i>	9538—“ “ 200 “ “ “	9 50
<i>Discord.</i>	9539—“ “ 300 “ “ “	11 25
<i>Disdain.</i>	1673—“ “ 400 “ “ “	12 35
<i>Displode.</i>	4861—“ “ 600 “ “ “	17 98
<i>Dispost.</i>	4864—“ “ 800 “ “ “	26 62
<i>Dispread.</i>	4866—“ “ 1000 “ “ “	31 58

I-T-E Circuit Breakers

For Direct Current Circuits of 500 Volts and under



Standard Switchboard Type

THE Midget Senior and Standard Switchboard types of Circuit Breakers are very similar in construction, the only difference being that the Midget Senior is smaller throughout its entire make-up and is chiefly intended for the protection of individual motors.

The Standard Switchboard type is fully serviceable in all capacities up to and including 700 amperes for all purposes for which Circuit Breakers are applicable.

Both types are of the highest standard of knife blade contact design. All current carrying parts are of copper, polished and lacquered. All other parts, including the frame, are Bauer-Barffe. Both types are mounted on a polished slate base arranged for back connection, but can be furnished for front connection if so ordered.

The base of the Midget Senior is 8 inches wide and 11 inches high, while that of the Standard Switchboard type is 10 inches wide and 14 inches high.

We can also furnish all Standard I-T-E Circuit Breakers not listed.

I-T-E Circuit Breakers

Plain Overload, Single Pole

For Direct Current Circuits of 500 Volts and under

Midget Senior Type

Code Word	No.	Actual Rating in Amperes	Range of Calibration in Amperes		List Each
			Lowest Capacity	Highest Capacity	
<i>Distaste.</i>	9702	5	4	8	\$24 00
<i>Distill.</i>	9703	10	8	15	24 00
<i>Disunite.</i>	9704	20	15	30	24 00
<i>Ditation.</i>	9705	30	25	45	24 00
<i>Ditcher.</i>	9706	45	35	70	24 00
<i>Diving.</i>	9707	60	45	90	30 00
<i>Divisor.</i>	9708	80	60	120	32 00
<i>Docible.</i>	9709	100	75	150	33 00
<i>Doctrine.</i>	9710	150	110	225	35 50
<i>Dodger.</i>	9711	200	150	300	37 00
<i>Dolphin.</i>	9712	300	225	450	40 00

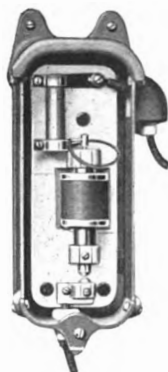
Standard Switchboard Type

Code Word	No.	Actual Rating in Amperes	Range of Calibration in Amperes		List Each
			Lowest Capacity	Highest Capacity	
<i>Domain.</i>	2898	80	60	120	\$43 50
<i>Domicile.</i>	2899	100	75	150	43 50
<i>Domineer.</i>	2900	150	110	225	43 50
<i>Domino.</i>	2901	200	150	300	45 00
<i>Donable.</i>	2902	300	225	450	54 50
<i>Donator.</i>	2904	400	300	600	61 00
<i>Doomful.</i>	2905	500	375	750	64 00
<i>Doorless.</i>	2906	600	450	900	67 00
<i>Dormant.</i>	4895	700	525	1000	71 50

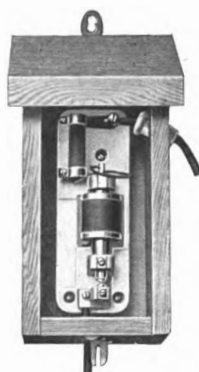
In ordering Circuit Breakers, to determine the size required, refer to the lowest and highest range of adjustment between which points they will be operated; the actual rating being given only to denote the capacity for continuous load, at which the heating will not exceed 20° C. above surrounding temperature.

Garton-Daniels Lightning Arresters

Type D. F.—Up to 350 Volts, D. C. or A. C.



No. 9725



No. 9726

THE Type D. F. Arrester is recommended for use on lighting and power circuits up to 350 volts D. C. or A. C., and standard practice is to use one Arrester on each feeder at the station, and Pole Arresters on each side of the circuit at intervals of one-half mile.

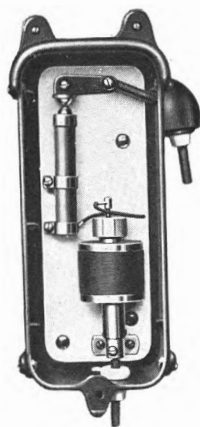
The Pole Arresters as shown above have a dipped metal finish, and both the wooden and iron covers are thoroughly weatherproof and are fitted with insulating bushings for the leading-in wires. The Station Arrester is similar to them, with the exception that it is furnished without a cover and the metal parts are highly polished and lacquered.

The air-gap distance in this Arrester is $\frac{1}{8}$ (.020) inch.

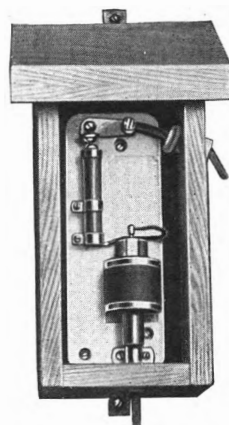
Code Word	No.	Description	Dimensions in Inches	Net Weight Each in Lbs.	List Each
<i>Dotage.</i>	9724	Station Type	$8\frac{1}{2} \times 3 \times 3$	$2\frac{3}{4}$	\$6 40
<i>Dowager.</i>	9725	Iron Covered, Pole Type	$12\frac{1}{2} \times 6 \times 4$	$11\frac{1}{8}$	7 80
<i>Downtrod.</i>	9726	Wooden " " "	$13\frac{1}{2} \times 7 \times 6$	$6\frac{1}{4}$	6 40

Garton-Daniels Lightning Arresters

Type EG—350 to 750 Volts, D. C.



No. 9728



No. 9730

THE Type EG Arrester is recommended for railway service, and standard practice calls for from five to seven Pole Arresters to each mile of line, with arresters on each car and on each feeder at the station.

The Pole Arresters have a dipped metal finish, while on the Station Arrester the metal parts are highly polished and lacquered.

The air-gap distance in this Arrester is $\frac{1}{80}$ (.025) inch. The series resistance averages 60 ohms.

Code Word	No.	Description	Dimensions in Inches	Net Weight Each in Lbs.	List Each
<i>Downward.</i>	9727	Station Type	$9\frac{1}{8} \times 3\frac{1}{2} \times 3$	$4\frac{1}{2}$	\$7 00
<i>Dramatic.</i>	9728	Iron Covered, Pole Type	$13\frac{1}{2} \times 6\frac{1}{2} \times 4\frac{1}{2}$	$13\frac{1}{2}$	8 00
<i>Drapery.</i>	9730	Wooden " " "	$14\frac{1}{2} \times 7 \times 6\frac{1}{2}$	$8\frac{1}{2}$	7 00

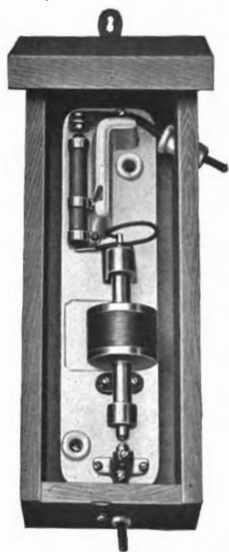
When above Arresters are to be used on a complete Metallic Circuit please so state when ordering.

Special Arresters for 1200 Volt D. C. Railway Circuits furnished to order.

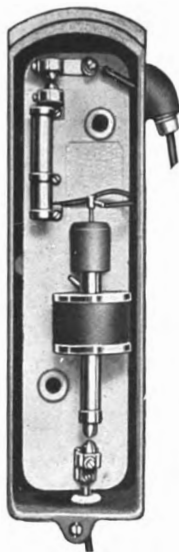
Garton-Daniels Lightning Arresters

Types CE & F

For 1,200 to 20,000 Volts, A. C.



Type CE
Pole Arrester in Wooden Cover,
with Lid Removed



Type CE
Pole Arrester in Iron Cover,
with Lid Removed

THE Type CE and Type F Arresters as listed on the opposite page, are used for the protection of alternating current, railway and power circuits of from 1,200 to 20,000 volts. The illustrations above show both the wood and iron covered Type CE Pole Arresters for use on circuits of 1,200 to 2,500 Volts.

The Type CE Arresters for use on circuits of over 2,500 volts, are composed of two or more of these arresters connected in series according to the voltage requirements.

Garton-Daniels Lightning Arresters

Types CE & F

For 1,200 to 20,000 Volts, A. C.

Continued

The Type F Arrester is very similar in construction to the Type CE, with the exception that there are three air-gaps in the Type F Arrester, two being placed at the top above the rod and one at the ground connection, while the Type CE has only two air-gaps, one being at the top and one at the ground connection. The series employed in the Type F Arrester is somewhat greater than that in the Type CE and the base is somewhat longer and heavier to accommodate it.

For circuits of over 5,000 volts, two or more Type F Arresters are connected in series according to the voltage requirements.

For pole arresters above 10,000 volts, the Station Type of Arrester is used and it is necessary to provide special housings in these cases.

Code Word	No.	Type	Voltage	Description	Dimensions in Inches	Net Weight in lbs.	List Each
<i>Drayman.</i>	9750	CE	1,200 to 2,500	Station Type	14 x 3½ x 3½	6½	\$ 8.80
<i>Dreamer.</i>	9751	CE	1,200 to 2,500	Iron Covered	16½ x 6 x 5	21	10.00
<i>Deary.</i>	9752	CE	1,200 to 2,500	Wooden Covered	19 x 7½ x 7½	12½	8.80
<i>Dredge.</i>	9753	F	2,500 to 3,500	Station Type	15 x 4 x 3½	8½	10.00
<i>Drinker.</i>	9754	F	2,500 to 3,500	Wooden Covered	20½ x 8½ x 8	15½	10.00
<i>Droller.</i>	9755	CE	3,500 to 5,000	Station Type	37½ x 8 x 7	20	22.00
<i>Drowth.</i>	9756	CE	3,500 to 5,000	Wooden Covered	36 x 8 x 7½	26½	22.00
<i>Drover.</i>	9757	F	5,000 to 6,600	Station Type	37½ x 8 x 18½	33½	23.80
<i>Drowsy.</i>	9758	F	5,000 to 6,600	Wooden Covered	37 x 10½ x 15½	44	23.80
<i>Drudger.</i>	9759	CE	6,600 to 7,500	Station Type	54½ x 8 x 18½	40	36.40
<i>Drugget.</i>	9760	CE	6,600 to 7,500	Wooden Covered	48½ x 12½ x 16½	52	36.40
<i>Drumbl.</i>	9761	F	7,500 to 8,500	Station Type	52½ x 8 x 18½	45	39.10
<i>Drummer.</i>	9762	F	7,500 to 8,500	Wooden Covered	52½ x 10½ x 16½	50	39.10
<i>Dualist.</i>	9763	F	8,500 to 10,000	Station Type	68 x 8 x 19½	61	48.60
<i>Dubious.</i>	9764	F	8,500 to 10,000	Wooden Covered	68½ x 10½ x 16½	73½	48.60
<i>Ductile.</i>	9765	F	10,000 to 12,500	Station Type	83½ x 8 x 19½	73	60.90
<i>Dulcimer.</i>	9766	F	12,500 to 15,000	Station Type	98½ x 8 x 19½	102	73.90
<i>Dullness.</i>	9767	F	15,000 to 17,500	Station Type	113½ x 8 x 19½	117	89.00
<i>Dumpling.</i>	9768	F	17,500 to 20,000	Station Type	129 x 8 x 19½	132	100.00

Westinghouse Lightning Arrester

Type M P



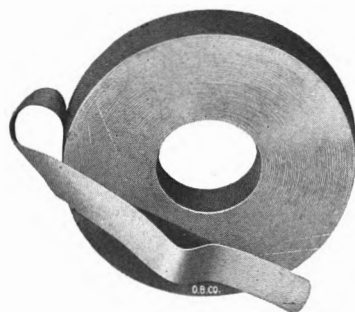
THE Multi-Path Lightning Arrester illustrated above supersedes the old Wurtz type of arrester and is suitable for use as a protection to the line, car equipment or as a station arrester on either alternating or direct current circuits up to 1000 volts. It is single pole and offers a freedom of discharge many times greater than any other type of low voltage arrester. Its name is derived from the fact that the static discharge spreads itself over a carborundum block along a number of minute discharge paths. The voltage across each gap is very small; therefore, the line voltage cannot maintain an arc across them.

Code Word
Duncify.

No. 9770—Type M P Lightning Arrester. \$5 65

List Each

Insulating Tapes



THE Buckeye brand of Friction Tape is our own special one, and will fill all requirements where a fair quality of goods at low prices is desired.

Code Word	No.	List per Pound
<i>Dungeon.</i>	1686—Buckeye, Black, $\frac{3}{4}$ -inch wide.....	\$0 82
<i>Duteous.</i>	2848—Manson, White, $\frac{3}{4}$ " "	1 37
<i>Dutiful.</i>	2849— " Black, $\frac{3}{4}$ " "	1 37
<i>Dwelling.</i>	4316—Grimshaw, " $\frac{3}{4}$ " "	1 75
<i>Dynasty.</i>	4318—Okonite, " Rubber, $\frac{3}{4}$ -inch wide.....	2 12
<i>Earldom.</i>	7619—P. & B. Weatherproof, $\frac{3}{4}$ " "	96

Orange Shellac Varnish

MADE of best quality of shellac gum dissolved in alcohol. This is unsurpassed as a finishing varnish for general purposes, and is especially suited for armatures, field coils, etc.

Code Word	No.	List per Gallon
<i>Earnful.</i>	5059—One Gallon Can.....	\$9 35

Dry Orange Shellac Gum

THIS is the best quality of Shellac Gum, and when dissolved in alcohol makes an excellent preparation for armature work, etc.

Code Word	No.	List per Pound
<i>Earthly.</i>	9749—Dry Shellac Gum.....	\$1 75

"P. & B." No. 2 Compound



THE "P. & B." Compound is unexcelled for its general insulating, water, oxide and alkali-proof properties. It is very penetrating, tenacious and elastic, and is especially valuable for all purposes where a durable preservative and a high insulating paint is required. It may be used with equally successful results on woods, metals or fabrics, for either indoor or outside work, such as painting armatures, fields, iron and wood poles, switch boxes, feeder and trolley wire supports, etc.

Code Word	No.	List per Gallon
<i>Easement.</i>	5046—Five Gallon Can.....	\$3 50
<i>Eatable.</i>	5047—One " "	3 75

Armalac

ARMALAC is an insulating "Compound" for armature and field work, and in this particular line has no equal. It dries quickly and thoroughly, but remains plastic and effectually prevents oxidization of copper when applied either to the bare surface or the insulation surrounding it.

Code Word	No.	List Each
<i>Ecstatic.</i>	5053—One Gallon Can.....	\$5 00

Uncut Sheet Mica



THE Mica listed below is of carefully selected first quality stock, and is especially suitable for electrical work.

Code Word	No.	Assortment	Will Cut Assorted Sizes			List per Pound
			Width	Length	Square Inches	
<i>Ectype.</i>	7886	No. A-1	4 to 8 in.	8 to 10 in.	35 to 47	\$7 50
<i>Edacious.</i>	7887	" 1	3 " 6 "	6 " 9 "	24 " 35	5 25
<i>Edgeless.</i>	7888	" 2	2 " 4 "	5 " 8 "	15 " 24	3 00

Hard Sheet Fibre

Fibre is furnished in sheets approximately 42 x 66 inches.

Unless otherwise specified Red Fibre will be supplied.

Code Word	No.	Thickness	Approximate Weight per Sheet	List per Pound
<i>Edible.</i>	7889	$\frac{3}{8}$ inch	4 pounds	\$0 75
<i>Editor.</i>	7890	$\frac{1}{8}$ "	8 "	62
<i>Educator.</i>	7891	$\frac{1}{8}$ "	16 "	62
<i>Effable.</i>	7893	$\frac{1}{4}$ "	32 "	62

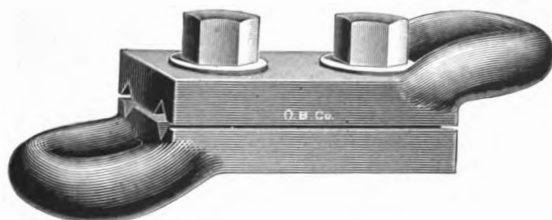
Sheet Asbestos

THIS material is especially suitable for insulating switches, cut-outs, wires, etc., from adjoining woodwork. It is regularly furnished in sheets 40 x 40 inches.

Code Word	No.	Thickness	Approximate Weight per Sheet	List per Pound
<i>Effigy.</i>	7895	$\frac{1}{8}$ inch	$3\frac{3}{4}$ to $4\frac{1}{2}$ pounds	\$0 18
<i>Effusion.</i>	7896	$\frac{1}{8}$ "	$7\frac{1}{2}$ " 8 "	18
<i>Egotist.</i>	7898	$\frac{1}{4}$ "	$13\frac{1}{2}$ " $14\frac{1}{2}$ "	18

Trolley Wire Screw Clamp

For Round, Figure 8 and Grooved Wires

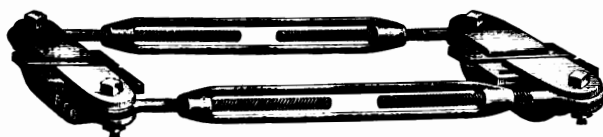


MAY be used either as a permanent or temporary clamp interchangeably with Round, Figure 8 and Grooved Wires, from Nos. 0 to 4-0 B. & S. gauge inclusive.

Code Word	No.	List Each
<i>Elatedly.</i>	5329—Screw Clamp	\$1 45

Trolley Wire Tightener

For Round, Figure 8 and Grooved Wires



THIS tool may be used interchangeably with Round, Figure 8 and Grooved Wires from Nos. 0 to 4-0 B. & S. gauge inclusive. As the above illustration shows, it is intended to facilitate the splicing of adjacent sections of trolley wire.

Code Word	No.	List Each
<i>Elderly.</i>	8126—Tightener	\$9 25

Stripping Tool

For Trolley Ears



THIS Tool is designed to facilitate removing ears from the trolley wire, and is particularly adapted for the various forms of Clinch Ears for round wire illustrated in this catalogue. The pointed end of the Tool is placed between the lips of the ear and the trolley wire, after which a few blows of a hammer on the end of the Tool will open the lips sufficiently to strip the ear from the wire.

Code Word	No.	List Each
<i>Elective.</i>	8123—Stripping Tool for Round Wire.....	\$3 45

Trolley Terminal Clamp

For Round and Grooved Wires

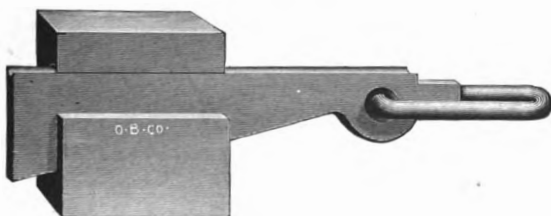


THIS Clamp is arranged for anchoring the end of the trolley wire. It is made of bronze in halves, which are clamped together by means of steel screws. The inside of the Clamp and the outer edge of one end are grooved for the reception of the trolley wire.

Code Word	No.	List Each
<i>Eligible.</i>	3203—Terminal Clamp for No. 0 B. & S. Round Wire.....	\$2 50
<i>Elocular.</i>	5331— " " " " 2-0 " " "	2 50
<i>Elision.</i>	3204— " " " " 3-0 " " "	3 05
<i>Eludible.</i>	5332— " " " " 4-0 " " "	3 05
<i>Elusion.</i>	5333— " " " " 2-0 " Grooved "	2 50
<i>Emanciate.</i>	5334— " " " " 3-0 " " "	3 05
<i>Emanate.</i>	5335— " " " " 4-0 " " "	3 05

Trolley Wire Wedge Clamp

For Round, Figure 8 and Grooved Wires



THIS Clamp secures a very powerful grip on the wire, as the greater the strain, the greater is the gripping effect of the Clamp. The grip of the Clamp on the wire is so positive that it can be released only by striking the small end of the wedge with a hammer.

Code Word	No.	List Each
<i>Embargo.</i>	8125—Wedge Clamp.....	\$5 40

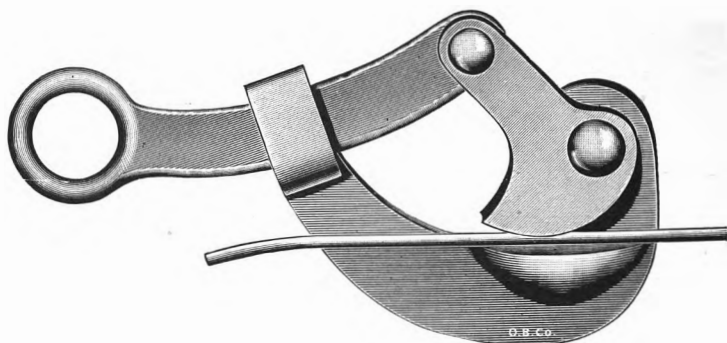
Cook Feeder Wire Sheave



THIS device is intended to facilitate the stringing of heavy feeder wires or cables after the poles and cross arms have been put up. In using the Sheave, it is slipped over the top of an insulator pin, and the feeder wire is passed over the pulley of the Sheave. By placing a Sheave on each pole, the wire or cable may be drawn over a number of cross arms at one time with ease, and without injury to the insulation of the wire. The groove of the pulley will take feeder wires up to $1\frac{1}{2}$ inches outside diameter.

Code Word	No.	List Each
<i>Embrace.</i>	7623—Feeder Wire Sheave.....	\$1 90

Haven's Wire Eccentric



Code Word	No.	List Each
<i>Emerald.</i>	5328—For No. 8 B. & S. and smaller diameters of Wire.....	\$3 75
<i>Emigrate.</i>	1799— " $\frac{1}{2}$ inch " " " " "	6 90

Detroit Screw Driver



THE double-pointed feature of the Detroit Screw Driver makes it especially useful for installing Detroit Trolley Clamps and Clamps of similar design, as in many places it is necessary to reach above the head in driving the screws to tighten the clamps upon the trolley wire. With the ordinary straight screw driver very little turning force can be exerted in this position, but with the Detroit Screw Driver the side blade can be used to advantage, and a powerful purchase obtained.

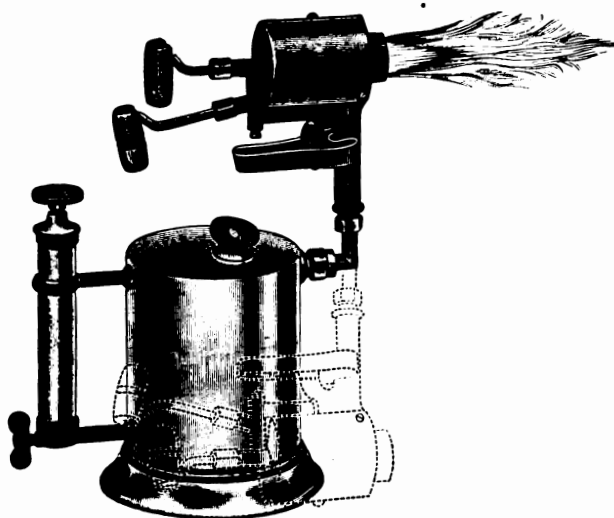
The tool is made of forged steel, insuring ample strength to withstand rough usage, and the large ring handle makes it convenient to hang to the tool belt.

As it is equally well adapted to straight driving it is a very useful addition to the lineman's tool equipment.

Code Word	No.	List Each
<i>Eminence.</i>	9848—Detroit Screw Driver.....	\$0 56

Turner Double Jet Blow Torch

Capacity One Quart



THE Double Jet Torch has a swiveled burner as shown in the illustration and is unequaled for heavy soldering, melting or brazing, and, as the burner is protected by a wind shield, it is particularly suitable for outside work. One of these jets regulates the flow of gas and the other the air mixture, so that a very intense heat can be produced.

The height over-all is $11\frac{1}{4}$ inches, diameter 4 inches, and the net weight $3\frac{1}{2}$ pounds.

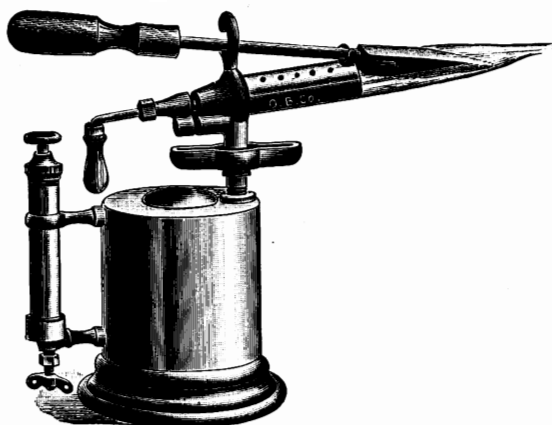
The use of 74 degree gasoline is recommended and the torch consumes approximately $1\frac{1}{4}$ pints per hour.

Code Word
Eminent.

No.	List Each
9781—Double Jet Torch, polished brass.....	\$8 50

White Combination Blow Torch

Capacity One Quart



THE Combination Blow Torch illustrated above has a new coil burner which vaporizes all the gasoline above the torch, and the flame passing through this coil generates a strong, steady flame at all times. It has an attachment on the burner for holding a soldering iron.

The tank is made of 18 gauge seamless brass with a concave steel bottom.

The height over-all is 10 inches, diameter $4\frac{1}{2}$ inches and the net weight 4 pounds.

The use of 74 degree gasoline is recommended with this torch and it consumes approximately $\frac{1}{2}$ pint per hour.

Code Word
Emissary.

No.
5373—Torch.....

List Each
\$5 50

White Combination Furnace

Capacity One Gallon



THE White Combination Furnace will heat soldering coppers and a pot of lead at the same time, and the construction is such that it may be used in windy weather without affecting the flame. The tank is made of 18 gauge seamless brass and is fitted with a brass pump.

The height over-all is 16 inches, diameter $6\frac{1}{2}$ inches and the net weight $9\frac{1}{2}$ pounds.

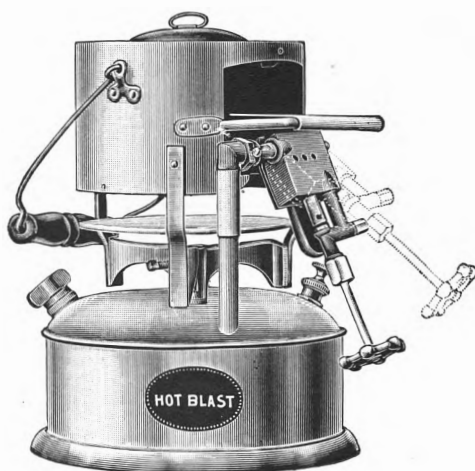
The use of 74 degree gasoline is recommended and it consumes approximately $1\frac{1}{2}$ pints per hour.

A Solder Pot 5 inches in diameter may be used with this furnace.

Code Word	No.	List Each
Emotive.	2987—Furnace	\$9 00

White Bonanza Furnace

Capacity Three Quarts



THE Bonanza Furnace has a heavy galvanized iron tank fitted with an automatic brass pump inside the tank. The tank can be used for heating soldering irons as well as melting lead, and the special bronze burner is swiveled so as to change the direction of the flame from the irons to the lead pot, as desired.

The height over-all is 12 inches, diameter $8\frac{1}{2}$ inches and the net weight 9 pounds.

The use of 74 degree gasoline is recommended and it consumes approximately $\frac{1}{4}$ pint per hour.

A Solder Pot 5 inches in diameter may be used with this furnace.

Code Word
Empanel.

No.

9783—Furnace.....

List Each

\$7 75

Solder Pots



Code Word	No.	List Each
<i>Emperil.</i>	9784—Solder Pot, diameter 5 inches.....	\$0 80
<i>Emperor.</i>	9785— " " " 6 "	1 20

Solder Ladles



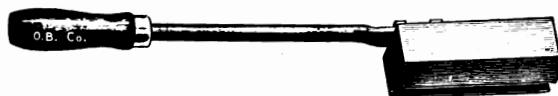
Code Word	No.	List Each
<i>Emphasis.</i>	2989—Ladle, diameter of Bowl 3 inches.....	\$0 45
<i>Emphatic.</i>	9786— " " " 4 "	60

Pointed Soldering Coppers



Code Word	No.	List per Pair
<i>Empire.</i>	5368—Weight per pair, 2 pounds.....	\$2 25
<i>Empress.</i>	5369— " " 4 "	4 30
<i>Emulate.</i>	5371—Wood Handles.....	12

Grooved Soldering Copper



Grooved on lower face to solder ears on trolley wire.

Code Word	No.	List Each
<i>Enation.</i>	1801—Grooved Copper with Handle.....	\$6 60

Half-and-Half Solder



This is strictly Half-and-Half Solder, and warranted equal to the best on the market.

Code Word	No.	List per Pound
<i>Encamp.</i>	1689—Bar Solder.....	\$0 75
<i>Enchant.</i>	1691—Wire " No. 10 B. & S., 68 pounds per spool.....	78

Celerity Soldering Salts

THIS is a very satisfactory, quick-acting, non-corrosive salts, manufactured exclusively for us, and is heartily recommended.

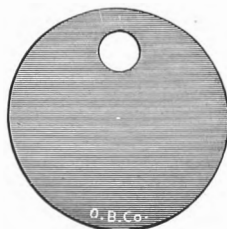
Code Word	No.	List Each
<i>Encore.</i>	9732—Celerity Soldering Salts, 1-pound bottle.....	\$0 75

Highland Soldering Paste

Absolutely free from acid or any ingredient injurious to insulation.

Code Word	No.	List Each
<i>Endict.</i>	2850—Two-ounce Box.....	\$0 50

Miner's Brass Checks



THESE Checks are made of No. 17 B. & S. gauge hard drawn sheet brass, are $1\frac{3}{8}$ inches in diameter, and have a $\frac{3}{16}$ -inch hole. They are regularly furnished plain with no stamping.

Code Word	No.	List per 1000
<i>Endogen.</i>	9788—Brass Checks.....	\$15 00

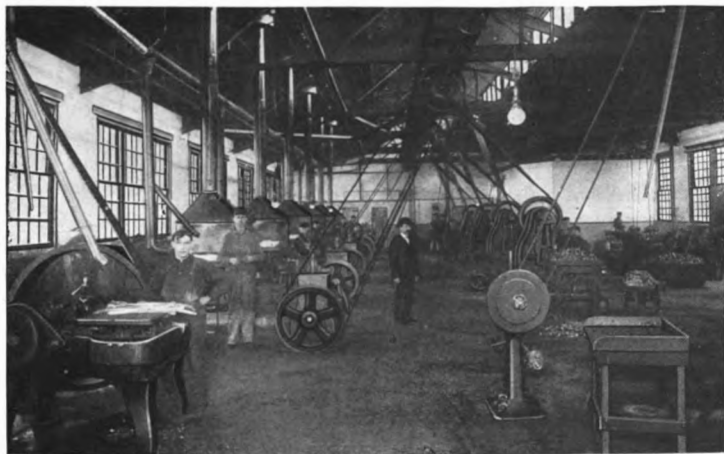
All-Wire Rail Bonds

Patented

Compressed and Soldered Terminal Types

General Description

THE steady increase in the sales of All-Wire Rail Bonds, and the fact that roads which bought them years ago are still among the ever-increasing list of users of this Bond, is conclusive proof that they are giving very satisfactory service, both in regard to life and conductivity, and have earned the popularity which they now enjoy.



O-B All-Wire Rail Bond Department

The secret of this success is the entire absence of joints in this Bond, the terminals themselves being an integral part of the flexible strand, which forms the body portion. The full capacity of the strand is carried direct to the rail in every Bond, there being no chance whatever of resistance being introduced by poor joints between the flexible portion or body and a cast or forged terminal.

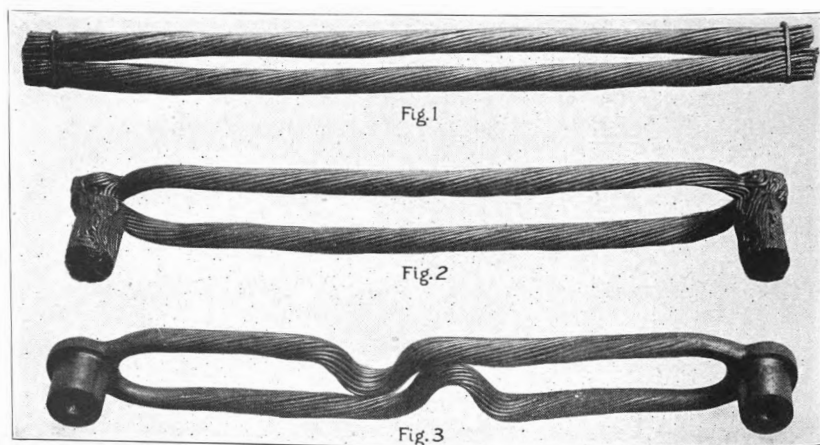
All-Wire Rail Bonds

Patented

Compressed and Soldered Terminal Types

General Description—Continued

THE "one-piece" feature of the All-Wire Bond is best shown by Figs. 1, 2 and 3 on this page, which show the actual steps in the manufacture of the Compressed Terminal Type. The two strands are cut off and tied together as shown in Fig. 1, then these two strands are gripped in a heading die, a certain definite distance from the ends, and the ends are then



Showing the "One-Piece" Feature of All-Wire Bonds

"upset" into the form of a head for the terminal as seen in Fig. 2. This insures a definite amount of copper compressed into each and every terminal. The terminals of the headed Bond are then heated in furnaces of a uniform temperature to a welding heat, and then welded to size and shape as shown in Fig. 3, all the separate strands in the terminals becoming a solid mass of homogeneous copper.

All-Wire Rail Bonds

Patented

Compressed and Soldered Terminal Types

General Description—Continued

AFTER being thoroughly cleansed from all foreign substances the terminals are shaved to an exact size and made perfectly smooth, thus insuring that each and every Bond will fit the hole in the rail perfectly, provided the drilling has been properly done.

To insure uniform ductility and strength, All-Wire Bonds are thoroughly annealed after all the working of the copper is completed, thus eliminating the hardening which occurs where copper is forged or drawn, or otherwise changed in structure. When the terminals of the Compressed Types of Bonds are compressed the annealed copper flows readily against the annular walls of the hole in the rail, forming absolute contact with every particle of the bright steel walls, shutting out all air and moisture, which insures immunity against rust or oxide, thus making a permanent joint of the highest obtainable efficiency.

In our Soldered Type Bonds the all-important "one-piece" feature has also been uniformly carried out. These Bonds receive the same care in welding, cleaning, annealing, etc., that the All-Wire Compressed Terminal Bonds are given, which facts alone are sufficient guarantee of their efficiency as perfect conductors and long-lived Bonds when properly installed. Instructions for installation accompany every order of this type of Bond, which, if followed, will produce a bonding job that is second to none.

The All-Wire Rail Bond is regularly manufactured in a variety of types and forms, a number of which are shown on the following pages, as well as the standard sizes in which they are made. In addition to these we are prepared to furnish to order, if desired, a variety of special styles and types, as well as special lengths and capacities not included in the regular lists.

All-Wire Rail Bonds

Patented

Compressed and Soldered Terminal Types

General Description—Continued

Directions for Ordering

IN ordering Bonds it is necessary that the following information be given us as fully as possible, viz.: *The type and form of bond desired, the distance from center to center of terminals, the diameter of terminals, the size or capacity required, the section number of rail and splice bar and maker's name, the distance from end of rail to center of first bolt hole, the distance between centers of first and second bolt holes, and the diameter of bolts.* If the bond holes are already drilled, *the distance from the ends of rails to the centers of holes for bond terminals* should be given in addition to the information called for above.

In case of any peculiar track conditions to be met, or any information desired, we are always glad to give customers the advantage of our long experience in furnishing bonds to meet all conditions.

All-Wire Rail Bond Patents

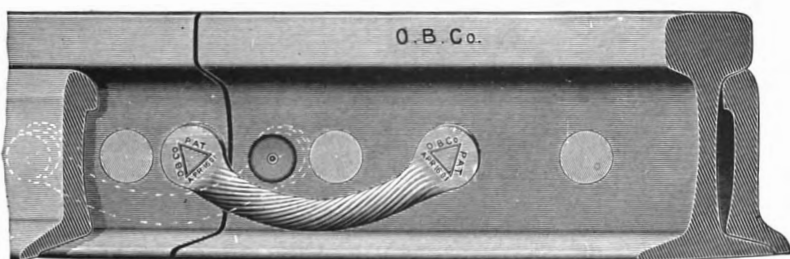
THE All-Wire Bond, of which we are exclusive manufacturers, is protected by the following patents:

Nos.	Nos.	Nos.
517,884	751,320	890,367
633,886	802,463	899,120
633,887	827,827	904,663
650,861	846,122	930,674
672,387	854,099	

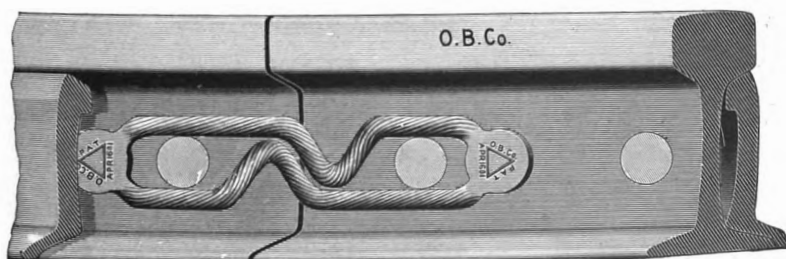
All-Wire Rail Bonds

Patented

Compressed Terminal Type



The above illustration shows a 75-pound Tee Rail double bonded with Type A, Form 1, All-Wire Rail Bonds.

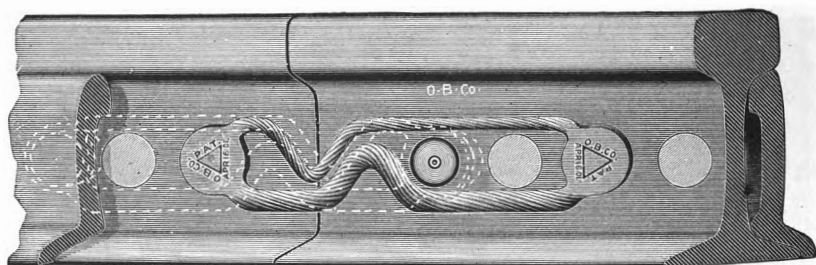


The above illustration shows a 70-pound Tee Rail bonded with one Type F, Form 3, All-Wire Rail Bond.

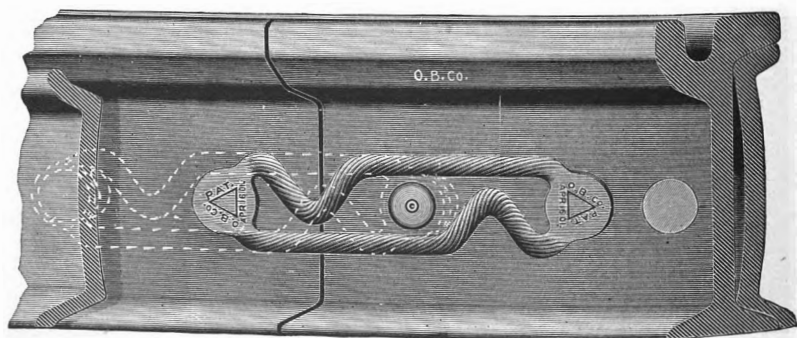
All-Wire Rail Bonds

Patented

Compressed Terminal Type



In the above illustration is shown a 70-pound Tee Rail double bonded with Type F, Form 6, All-Wire Rail Bonds.

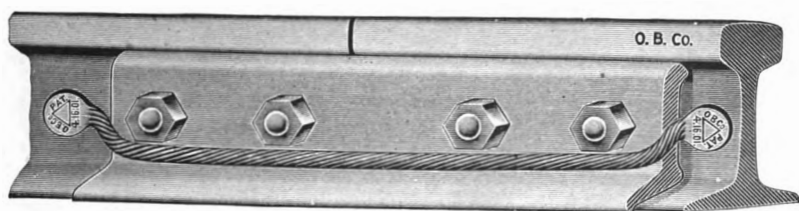


The above illustration shows a 90-pound Girder Rail double bonded with Type F, Form 7, All-Wire Rail Bonds.

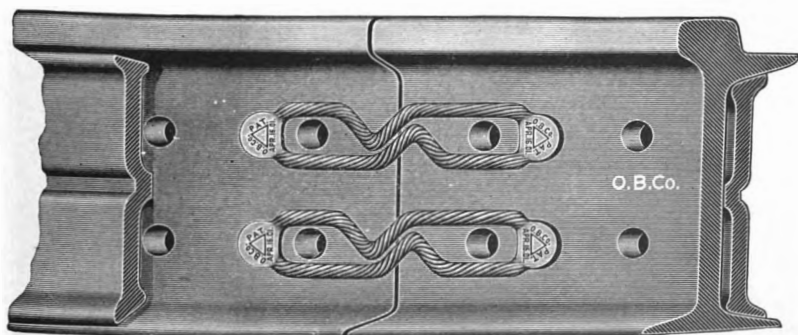
All-Wire Rail Bonds

Patented

Compressed Terminal Type



In the above illustration is shown a 70-pound Tee Rail bonded with a Type E All-Wire Rail Bond around the fish plate.

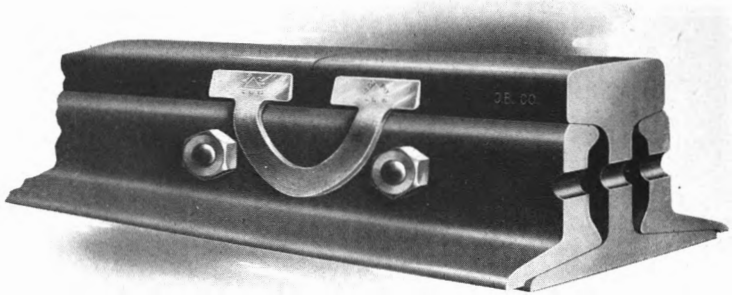


The above illustration shows a Girder Rail double bonded with Type F, Form 3, All-Wire Rail Bonds.

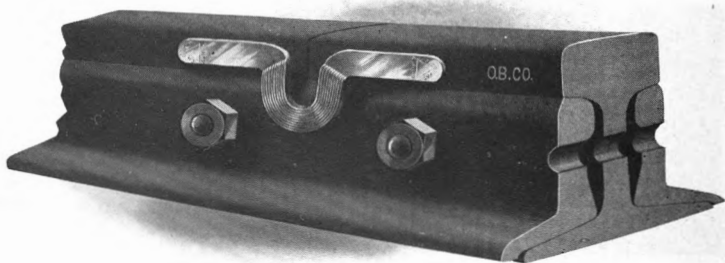
All-Wire Rail Bonds

Patented

Soldered Terminal



THIS illustration shows a 75-pound Tee Rail bonded with a Type GD, Form 1, All-Wire Rail Bond with Soldered Terminals.



IN the above illustration is shown a 75-pound Tee Rail bonded with a Type GA, Form 2, All-Wire Rail Bond with Soldered Terminals. Note the manner in which the crimp of the bond clears the projecting fish plate.

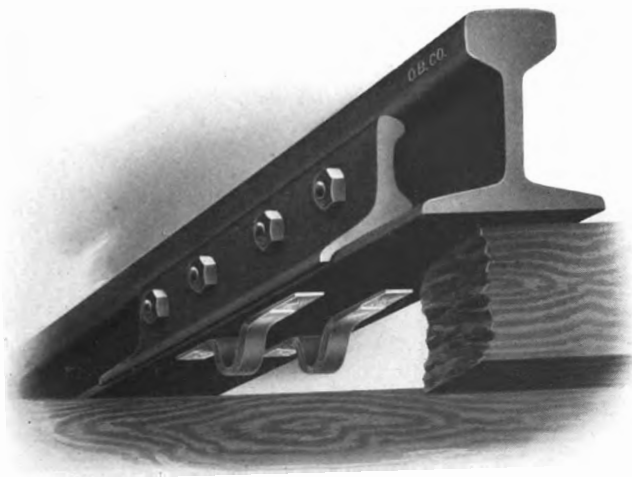
All-Wire Rail Bonds

Patented

Soldered Terminal



THIS illustration shows a 75-pound Tee Rail bonded with a Type HL, Form 1, All-Wire Rail Bond with Soldered Terminals placed around the fish plate.



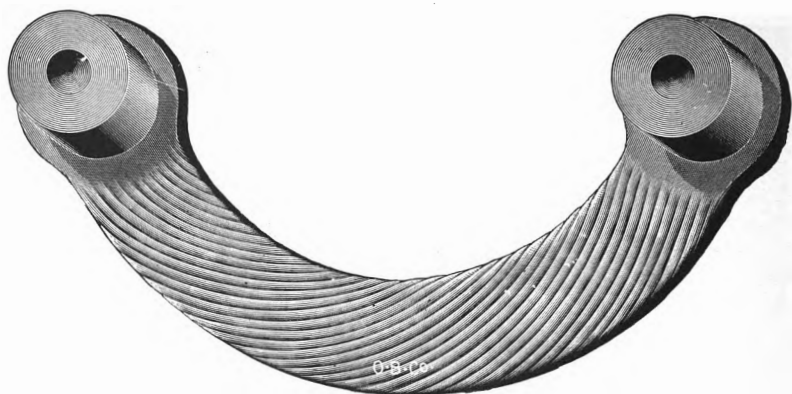
IN the above illustration is shown a 75-pound Tee Rail double bonded with Type GA, Form 1, All-Wire Rail Bond with Soldered Terminals.

All-Wire Rail Bonds

Patented

Compressed Terminal

Type A—Form 1



THIS Bond is intended to be used under the Splice Bar, where it is not desired to span the bolts and where the conditions will permit of a short bond being used.

It is regularly furnished in the following sizes: 0 capacity, $\frac{1}{2}$ -inch and $\frac{5}{8}$ -inch terminals; 2-0 capacity, $\frac{1}{2}$ -inch, $\frac{5}{8}$ -inch and $\frac{3}{4}$ -inch terminals; 3-0 and 4-0 capacity, $\frac{3}{4}$ -inch and $\frac{7}{8}$ -inch terminals, and in lengths from 4 inches to 6 inches inclusive.

In ordering Bonds give full information as called for on page 182.

For Rail Bond Compressors see pages 201-203.

All-Wire Rail Bonds

Patented

Compressed Terminal

Type F—Forms 3 to 8

THE Type F Rail Bonds illustrated and listed on the following pages are designed for installing on the web of the rail under the splice bar, and the various forms shown are intended to take care of the numerous conditions arising from this method of bonding. The several forms can be used singly to span one or more bolts, or can be combined for double or quadruple bonding. The flexible body portions of the Forms 3, 5 and 7 are made from the same size of cable, while in the Forms 4, 6 and 8 the cables forming the body are of unequal size.

On pages 183, 184 and 185 are shown several forms of the Type F All-Wire Rail Bond installed on rails under different conditions.

The lists on the following pages show the standard lengths of Type F Bonds, but we are prepared to make up these bonds in any desired length, from 6 to 22 inches, to meet special requirements.

The Hydraulic Compressor listed on page 203, or the Rail Bond Compressor and Compressor Wrench listed on page 201, should be used for the installation of all forms of Type F Bonds.

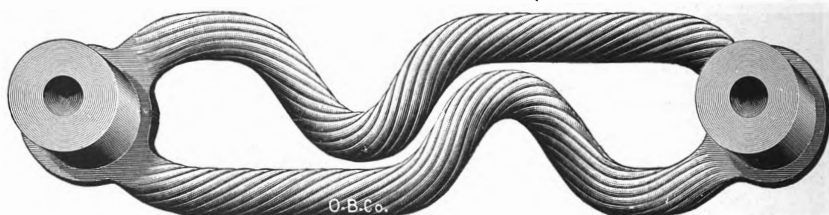
When ordering Bonds please give all the information requested in instructions for ordering on page 182.

All-Wire Rail Bonds

Patented

Compressed Terminal

Type F—Form 3



Length 8 Inches					Length 10 Inches				
Code Word	No.	Cap B. & S. Gauge	Size of Term. Inches	List per 100	Code Word	No.	Cap B. & S. Gauge	Size of Term. Inches	List per 100
<i>Enslave.</i>	7167	0	$\frac{1}{2}$	\$46 00	<i>Erasable.</i>	7185	0	$\frac{1}{2}$	\$49 00
<i>Entangle.</i>	7168	0	$\frac{3}{8}$	48 50	<i>Eraser.</i>	7186	0	$\frac{3}{8}$	51 50
<i>Enticer.</i>	7169	2-0	$\frac{1}{2}$	51 40	<i>Erasion.</i>	7187	2-0	$\frac{1}{2}$	54 60
<i>Entity.</i>	7170	2-0	$\frac{5}{8}$	51 40	<i>Ermine.</i>	7188	2-0	$\frac{5}{8}$	54 60
<i>Entomb</i>	7171	2-0	$\frac{3}{4}$	56 90	<i>Eroded.</i>	7189	2-0	$\frac{3}{4}$	60 10
<i>Entreat.</i>	7172	3-0	$\frac{3}{4}$	63 80	<i>Erogate.</i>	7190	3-0	$\frac{3}{4}$	68 60
<i>Enviable.</i>	7173	3-0	$\frac{7}{8}$	65 80	<i>Errand.</i>	7191	3-0	$\frac{7}{8}$	70 60
<i>Envious.</i>	7174	4-0	$\frac{3}{4}$	66 50	<i>Erratic.</i>	7192	4-0	$\frac{3}{4}$	72 50
<i>Epidemic.</i>	7175	4-0	$\frac{7}{8}$	69 00	<i>Errorist.</i>	7193	4-0	$\frac{7}{8}$	75 00

Length 9 Inches					Length 11 Inches				
Code Word	No.	Cap B. & S. Gauge	Size of Term. Inches	List per 100	Code Word	No.	Cap B. & S. Gauge	Size of Term. Inches	List per 100
<i>Epidermis.</i>	7176	0	$\frac{1}{2}$	\$47 50	<i>Erudiate.</i>	7194	0	$\frac{1}{2}$	\$50 60
<i>Epilogue.</i>	7177	0	$\frac{3}{8}$	50 00	<i>Eruption.</i>	7195	0	$\frac{3}{8}$	53 10
<i>Episode.</i>	7178	2-0	$\frac{1}{2}$	53 00	<i>Escapade.</i>	7196	2-0	$\frac{1}{2}$	56 30
<i>Epitaph.</i>	7179	2-0	$\frac{3}{8}$	53 00	<i>Escaper.</i>	7197	2-0	$\frac{3}{8}$	56 30
<i>Equate.</i>	7180	2-0	$\frac{3}{4}$	58 50	<i>Eschew.</i>	7198	2-0	$\frac{3}{4}$	61 80
<i>Equator.</i>	7181	3-0	$\frac{3}{4}$	66 20	<i>Escort.</i>	7199	3-0	$\frac{3}{4}$	71 10
<i>Equinox.</i>	7182	3-0	$\frac{7}{8}$	68 20	<i>Esculent.</i>	7200	3-0	$\frac{7}{8}$	73 10
<i>Eradiate.</i>	7183	4-0	$\frac{3}{4}$	69 50	<i>Escurial.</i>	7201	4-0	$\frac{3}{4}$	75 60
<i>Equipage.</i>	7184	4-0	$\frac{7}{8}$	72 00	<i>Esquire.</i>	7202	4-0	$\frac{7}{8}$	78 10

Bonds of intermediate lengths between those specified above will take proportionate prices.

In ordering Bonds give full information as called for on page 182.

For Rail Bond Compressors see pages 201-203.

All-Wire Rail Bonds

Patented

Compressed Terminal

Type F—Form 4



Length 8 Inches					Length 10 Inches				
Code Word	No.	Cap B. & S. Gauge	Size of Term. Inches	List per 100	Code Word	No.	Cap B. & S. Gauge	Size of Term. Inches	List per 100
<i>Essayer</i>	7235	2-0	$\frac{1}{2}$	\$51 40	<i>Eulogist.</i>	7249	2-0	$\frac{1}{2}$	\$54 60
<i>Essence.</i>	7236	2-0	$\frac{5}{8}$	51 40	<i>Eulogy.</i>	7250	2-0	$\frac{5}{8}$	54 60
<i>Essoiner.</i>	7237	2-0	$\frac{3}{4}$	56 90	<i>Euphonic.</i>	7251	2-0	$\frac{3}{4}$	60 10
<i>Esteemer.</i>	7238	3-0	$\frac{3}{4}$	63 80	<i>Eutaxy.</i>	7252	3-0	$\frac{3}{4}$	68 60
<i>Estrade.</i>	7239	3-0	$\frac{7}{8}$	65 80	<i>Evadible.</i>	7253	3-0	$\frac{7}{8}$	70 60
<i>Estrange.</i>	7240	4-0	$\frac{3}{4}$	66 50	<i>Evanescence.</i>	7254	4-0	$\frac{3}{4}$	72 50
<i>Estreat.</i>	7241	4-0	$\frac{7}{8}$	69 00	<i>Evangel.</i>	7255	4-0	$\frac{7}{8}$	75 00

Length 9 Inches					Length 11 Inches				
Code Word	No.	Cap B. & S. Gauge	Size of Term. Inches	List per 100	Code Word	No.	Cap B. & S. Gauge	Size of Term. Inches	List per 100
<i>Estuary.</i>	7242	2-0	$\frac{1}{2}$	\$53 00	<i>Evasion.</i>	7256	2-0	$\frac{1}{2}$	\$56 30
<i>Etcher.</i>	7243	2-0	$\frac{5}{8}$	53 00	<i>Erection.</i>	7257	2-0	$\frac{5}{8}$	56 30
<i>Eternal.</i>	7244	2-0	$\frac{3}{4}$	58 50	<i>Everer.</i>	7258	2-0	$\frac{3}{4}$	61 80
<i>Ethereal.</i>	7245	3-0	$\frac{3}{4}$	66 20	<i>Eventful.</i>	7259	3-0	$\frac{3}{4}$	71 10
<i>Ethical.</i>	7246	3-0	$\frac{7}{8}$	68 20	<i>Eventide.</i>	7260	3-0	$\frac{7}{8}$	73 10
<i>Ethicist.</i>	7247	4-0	$\frac{3}{4}$	69 50	<i>Eversion.</i>	7261	4-0	$\frac{3}{4}$	75 60
<i>Etiolate.</i>	7248	4-0	$\frac{7}{8}$	72 00	<i>Evilness.</i>	7262	4-0	$\frac{7}{8}$	78 10

Bonds of intermediate lengths between those specified above will take proportionate prices.

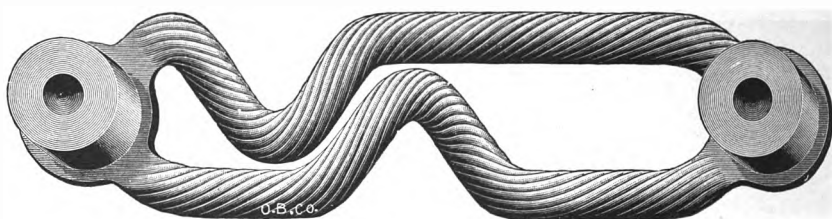
In ordering Bonds give full information as called for on page 182.

For Rail Bond Compressors see pages 201-203.

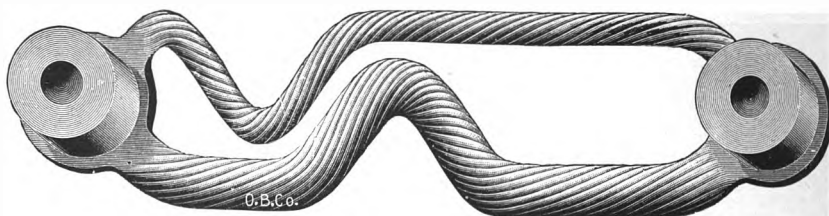
All-Wire Rail Bonds

Patented

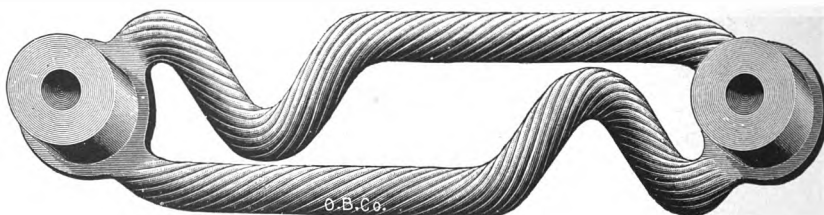
Compressed Terminal



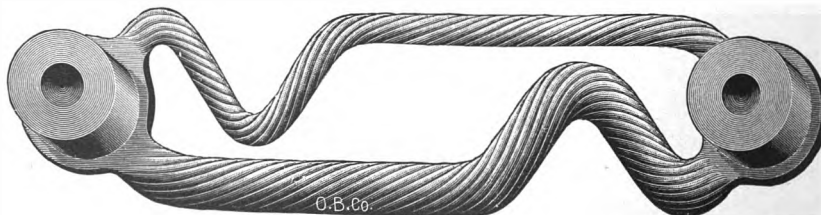
Type F—Form 5



Type F—Form 6



Type F—Form 7



Type F—Form 8

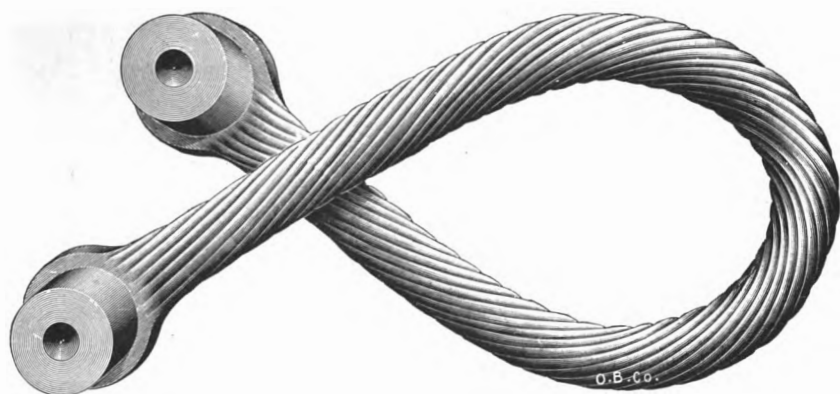
THE above forms of Bonds can be furnished in the same sizes as the Forms 3 and 4 Bonds listed on pages 190 and 191. -

All-Wire Rail Bonds

Patented

Compressed Terminal

Type E—Form 1



THE Type E Rail Bond listed on the following page can be used either for cross-bonding or bonding around the Splice Bar, where conditions are such that it is impossible to use a concealed bond at all, or the proper capacity cannot be installed under the plate.

Length 22 Inches					Length 24 Inches				
Code Word	No.	Cap. B. & S. Gauge	Size of Term. Inches	List per 100	Code Word	No.	Cap. B. & S. Gauge	Size of Term. Inches	List per 100
<i>Evincive.</i>	10497	0	1 1/2	\$68 10	<i>Excide.</i>	6180	0	1 1/2	\$71 10
<i>Evitate.</i>	10498	0	1 1/2	70 60	<i>Excision.</i>	6181	0	1 1/2	73 60
<i>Evocate.</i>	10499	2-0	1 1/2	75 70	<i>Excitate.</i>	6182	2-0	1 1/2	79 30
<i>Evocator.</i>	10500	2-0	1 1/2	75 70	<i>Excocet.</i>	6183	2-0	1 1/2	79 30
<i>Exaltate.</i>	10501	2-0	1 1/2	81 20	<i>Excuser.</i>	6184	2-0	1 1/2	84 80
<i>Exalted.</i>	10502	3-0	1 1/2	98 10	<i>Executor.</i>	6185	3-0	1 1/2	102 70
<i>Example.</i>	10503	3-0	1 1/2	100 10	<i>Exercent.</i>	6186	3-0	1 1/2	104 70
<i>Exceeder.</i>	10504	4-0	1 1/2	109 30	<i>Exertive.</i>	6187	4-0	1 1/2	114 70
<i>Excerpt.</i>	10505	4-0	1 1/2	111 80	<i>Exhale.</i>	6188	4-0	1 1/2	117 20

See list of other sizes of Type E Bonds on page 194.

Bonds of intermediate lengths between those specified above will take proportionate prices.

In ordering Bonds give full information as called for on page 182.

For Rail Bond Compressors see pages 201-203.

All-Wire Rail Bonds

Patented

Compressed Terminal

Type E—Form 1

Length 26 Inches				
Code Word	No.	Cap. B. & S. Gauge	Size of Term. Inches	List per 100
<i>Exiguous.</i>	10506	0	$\frac{1}{8}$	\$74 10
<i>Exister.</i>	10507	0	$\frac{1}{8}$	76 60
<i>Exocarp.</i>	10508	2-0	$\frac{1}{8}$	82 90
<i>Exorable.</i>	10509	2-0	$\frac{1}{8}$	82 90
<i>Exorate.</i>	10510	2-0	$\frac{1}{8}$	88 40
<i>Exortive.</i>	10511	3-0	$\frac{1}{8}$	107 30
<i>Exossate.</i>	10512	3-0	$\frac{1}{8}$	109 30
<i>Expander.</i>	10513	4-0	$\frac{1}{8}$	120 10
<i>Expanse.</i>	10514	4-0	$\frac{1}{8}$	122 60
Length 28 Inches				
<i>Expeller.</i>	6198	0	$\frac{1}{8}$	\$77 10
<i>Expertly.</i>	6199	0	$\frac{1}{8}$	79 60
<i>Explate.</i>	6200	2-0	$\frac{1}{8}$	86 50
<i>Exploit.</i>	6201	2-0	$\frac{1}{8}$	86 50
<i>Expone.</i>	6202	2-0	$\frac{1}{8}$	92 00
<i>Exposal.</i>	6203	3-0	$\frac{1}{8}$	111 90
<i>Exposer.</i>	6204	3-0	$\frac{1}{8}$	113 90
<i>Expound.</i>	6205	4-0	$\frac{1}{8}$	125 50
<i>Expulse.</i>	6206	4-0	$\frac{1}{8}$	128 00
Length 30 Inches				
<i>Expunge.</i>	6207	0	$\frac{1}{8}$	\$80 10
<i>Expurge.</i>	6208	0	$\frac{1}{8}$	82 60
<i>Exscind.</i>	6209	2-0	$\frac{1}{8}$	90 10
<i>Extender.</i>	6210	2-0	$\frac{1}{8}$	90 10
<i>Extoller.</i>	6211	2-0	$\frac{1}{8}$	95 60
<i>Foiler.</i>	6212	3-0	$\frac{1}{8}$	116 50
<i>Exundate.</i>	6213	3-0	$\frac{1}{8}$	118 50
<i>Exurgent.</i>	6214	4-0	$\frac{1}{8}$	130 90
<i>Exuviate.</i>	6215	4-0	$\frac{1}{8}$	133 40
Length 32 Inches				
<i>Gaborage.</i>	6225	0	$\frac{1}{8}$	\$83 10
<i>Gabble.</i>	6226	0	$\frac{1}{8}$	85 60
<i>Gablet.</i>	6227	2-0	$\frac{1}{8}$	93 70
<i>Gaddish.</i>	6228	2-0	$\frac{1}{8}$	93 70
<i>Gainable.</i>	6229	2-0	$\frac{1}{8}$	99 20
<i>Gainsay.</i>	6230	3-0	$\frac{1}{8}$	121 10
<i>Gaiter.</i>	6231	3-0	$\frac{1}{8}$	123 10
<i>Gallant.</i>	6232	4-0	$\frac{1}{8}$	136 30
<i>Galley.</i>	6233	4-0	$\frac{1}{8}$	138 80

Length 36 Inches				
Code Word	No.	Cap. B. & S. Gauge	Size of Term. Inches	List per 100
<i>Gallop.</i>	6261	0	$\frac{1}{8}$	\$89 10
<i>Gallows.</i>	6262	0	$\frac{1}{8}$	91 60
<i>Gangrene.</i>	6263	2-0	$\frac{1}{8}$	100 90
<i>Gangway.</i>	6264	2-0	$\frac{1}{8}$	100 90
<i>Garbed.</i>	6265	2-0	$\frac{1}{8}$	106 40
<i>Gardant.</i>	6266	3-0	$\frac{1}{8}$	130 30
<i>Garden.</i>	6267	3-0	$\frac{1}{8}$	132 30
<i>Gargle.</i>	6268	4-0	$\frac{1}{8}$	147 10
<i>Garnish.</i>	6269	4-0	$\frac{1}{8}$	149 60
Length 38 Inches				
<i>Garret.</i>	6287	4-0	$\frac{1}{8}$	155 00
Length 40 Inches				
<i>Garrison.</i>	6305	4-0	$\frac{1}{8}$	160 40
Length 42 Inches				
<i>Gateless.</i>	6984	4-0	$\frac{1}{8}$	165 80
Length 60 Inches				
<i>Gateway.</i>	6359	4-0	$\frac{1}{8}$	214 40
Length 66 Inches				
<i>Gatherer.</i>	9102	4-0	$\frac{1}{8}$	230 60
Length 70 Inches				
<i>Gaudily.</i>	9111	4-0	$\frac{1}{8}$	241 40
Length 72 Inches				
<i>Gauntry.</i>	9120	4-0	$\frac{1}{8}$	246 80

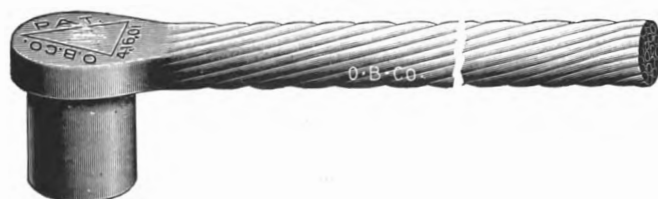
Above Bonds from 38 to 72 inches in length can also be furnished in 0 capacity with $\frac{1}{8}$ -inch and $\frac{3}{8}$ -inch Terminals; 2-0 capacity with $\frac{1}{4}$ -inch, $\frac{3}{8}$ -inch and $\frac{1}{2}$ -inch Terminals; 3-0 capacity with $\frac{1}{4}$ -inch and $\frac{1}{2}$ -inch Terminals, and 4-0 capacity with $\frac{1}{2}$ -inch Terminals.

Bonds of intermediate lengths between those specified above will take proportionate prices.
 In ordering Bonds give full information as called for on page 182.
 For Rail Bond Compressors see pages 201-203.

All-Wire Bond Terminals

Compressed Terminal

Patented



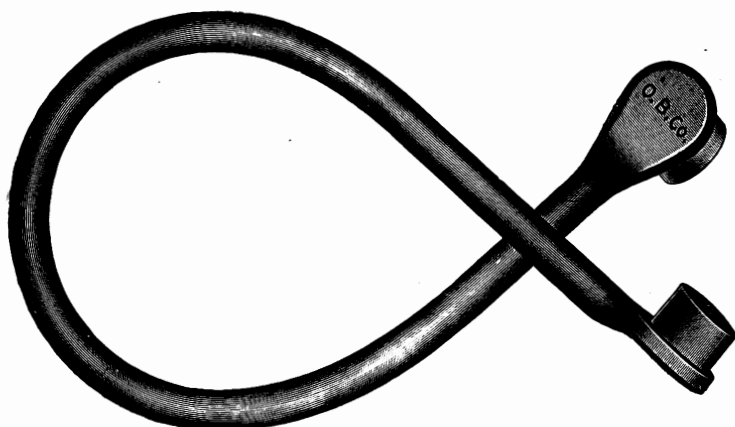
BOND Terminals consist of a single terminal with 12 inches of cable extension. These are used for connecting lightning arresters and other ground wires to the rail, or for making up extra long bonds for use around special work, as in such cases old trolley wire can be used to advantage.

Code Word	No.	List per 100
<i>Gayety.</i>	7533— Bond Terminals, No. 0 B. & S. Gauge, $\frac{1}{2}$ -inch Terminal . . .	\$35 55
<i>Gayness.</i>	7534— " " " 0 " " $\frac{5}{8}$ " " . . .	36 80
<i>Gazelle.</i>	7535— " " " 2-0 " " $\frac{1}{2}$ " " . . .	39 65
<i>Gazette.</i>	7536— " " " 2-0 " " $\frac{5}{8}$ " " . . .	39 65
<i>Gender.</i>	7537— " " " 2-0 " " $\frac{3}{4}$ " " . . .	42 40
<i>Genitive.</i>	7538— " " " 3-0 " " $\frac{3}{4}$ " " . . .	51 35
<i>Genteel.</i>	7539— " " " 3-0 " " $\frac{7}{8}$ " " . . .	52 35
<i>Gentle.</i>	7540— " " " 4-0 " " $\frac{3}{4}$ " " . . .	57 35
<i>Gentry.</i>	7541— " " " 4-0 " " $\frac{7}{8}$ " " . . .	58 60

In ordering Bond Terminals state length of wire, capacity and size of Terminal required.

Solid Wire Rail Bonds

Compressed Terminal



THERE are a number of instances where the Solid Bond will be found of advantage, as in the case of cross-bonding, bonding around joints in mines, or places where it is not possible to place the bond underneath the splice bar. For exposed places, the solid bond is less liable to be injured than the flexible bond. The Solid Wire Bond manufactured by The Ohio Brass Company is made of one piece of commercially pure copper. The Rail Bond Compressors shown on pages 201-203 are recommended for their installation.

Code Word	No.	Length Inches	Capacity B. & S. Gauge	Size of Terminal Inches	List per 100
<i>Geognost.</i>	10515	24	0	$\frac{1}{2}$	\$ 71 10
<i>Geology.</i>	10516	24	2-0	$\frac{1}{2}$	79 30
<i>Geometry.</i>	10517	24	4-0	$\frac{1}{2}$	114 70
<i>Geranium.</i>	10518	24	4-0	$\frac{1}{2}$	117 20
<i>Germanic.</i>	10519	26	0	$\frac{1}{2}$	74 10
<i>Germless.</i>	10520	26	2-0	$\frac{1}{2}$	82 90
<i>Getter.</i>	10521	26	4-0	$\frac{1}{2}$	120 10
<i>Ghastful.</i>	10522	26	4-0	$\frac{1}{2}$	122 60
<i>Ghastly.</i>	10523	28	0	$\frac{1}{2}$	77 10
<i>Giantly.</i>	10524	28	2-0	$\frac{1}{2}$	86 50
<i>Giblet.</i>	10525	28	4-0	$\frac{1}{2}$	125 50
<i>Giddily.</i>	10526	28	4-0	$\frac{1}{2}$	128 00

All orders or inquiries for these Bonds should be accompanied with complete specifications called for on page 182.

All-Wire Rail Bonds

Patented

Soldered Terminal

Type GA Form 1



THIS Bond has a wide range of application. The smaller sizes are particularly adapted for installation where light weight rails with strap joints are used, and the larger sizes for use on third rail system and elevated structures. It is applied either to the face surface of the rail base (where space will permit), or to the lower surface of the latter, as shown on page 187. Where the bond is to be attached to the lower surface of the rail in new track, the most convenient method is to apply them before the rails are spiked to the tie. This can be readily done by inverting the section of the track consisting of several rails, and after the bonds have been applied, the rail can be returned to place and spiked down.

Code Word	No.	Capacity B. & S. Gauge or Circular Mils	Length of Bond Formed Inches	Length of Bond Not Formed Inches	List per 100
<i>Gigantic.</i>	8239	2-0	6	6 $\frac{3}{8}$	\$ 45 00
<i>Gilder.</i>	8241	4-0	7	8 $\frac{1}{2}$	60 25
<i>Ginger.</i>	8243	300,000	7	8 $\frac{1}{2}$	72 80
<i>Gingerly.</i>	8244	500,000	8 $\frac{1}{2}$	10 $\frac{1}{2}$	127 50

All inquiries or orders for Bonds must give complete specifications as called for on page 182.

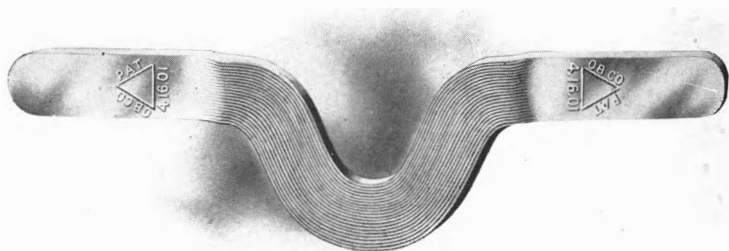
For Bonding Tools see pages 208 to 214.

All-Wire Rail Bonds

Patented

Soldered Terminal

Type GA—Form 2



THIS form of Bond is designed for attachment to the outer side of the ball of girder and tee rails, or in some cases, where space will permit, under the tram of girder rails. The plane in which the body of the bond lies is such as to clear the fish plate even where the latter projects beyond the ball of the rail, as shown in the illustration on page 186.

Code Word	No.	Capacity B. & S. Gauge or Circular Mils	Length of Bond Formed Inches	Length of Bond Not Formed Inches	List per 100
<i>Gingham.</i>	8249	2-0	6½	8	\$45 00
<i>Girdle.</i>	8236	4-0	7½	8½	56 50
<i>Glacier.</i>	8253	300,000	8½	10	72 80

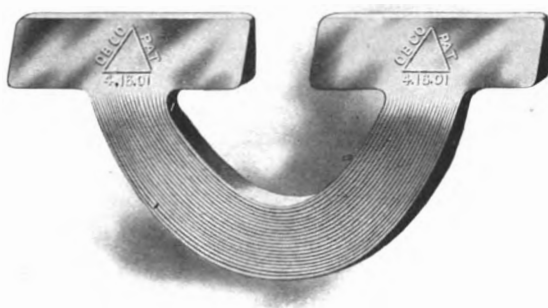
All inquiries or orders for Bonds must give complete specifications as called for on page 182.
For Bonding Tools see pages 208 to 214.

All-Wire Rail Bonds

Patented

Soldered Terminal

Type G D—Form 1



THE Type GD Bond is a departure from the usual forms of Rail Bonds with Soldered Terminals in that the flexible portion is brought out from the lower edge and at the center of each terminal, thus distributing all torsional strain equally throughout the terminal. The terminals are tapered with the thinner edge at the top, thus making the Bond more secure against being struck or injured. This Bond is intended for use on the outer face of the ball of the rail.

Code Word	No.			List per 100
<i>Gladden.</i>	9122—	Type GD Bond	2-0	Capacity.....\$ 45 80
<i>Gladiole.</i>	9124—	" " "	4-0	" 60 25
<i>Glaring.</i>	9126—	" " "	300,000 C.M.	" 74 80
<i>Glassen.</i>	9127—	" " "	500,000	" 120 00

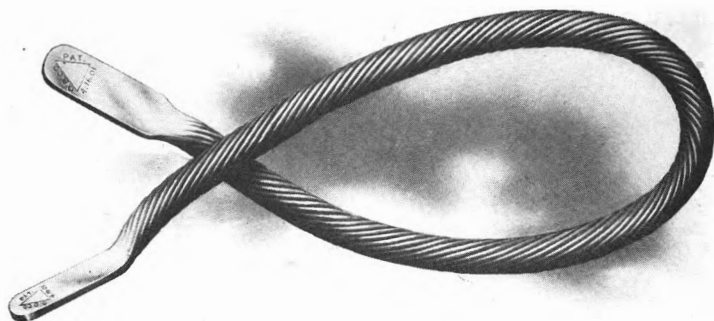
All inquiries or orders for Bonds must give complete specifications as called for on page 182.

For Bonding Tools see pages 208 to 214.

All-Wire Rail Bonds

Patented

Type HL—Form 1 Soldered Terminal



WHERE a long bond is required for bonding around the fish plate or for cross-connecting and special bonding work, such as at crossings, turn-outs, etc., the Type HL, Form 1, Bond is especially recommended. Each of the terminals of this Bond is 3 inches long and for this reason the lengths as listed below are 6 inches longer than a corresponding bond of the compressed terminal type; the lengths given here being the over-all dimensions.

Code Word	No.	Total Length Inches	Cap. B. & S. Gauge	List per 100	Code Word	No.	Total Length Inches	Cap. B. & S. Gauge	List per 100
<i>Glassful.</i>	8439	30	4-0	\$118 75	<i>Gleaner.</i>	8445	54	4-0	\$183 55
<i>Glazen.</i>	8441	36	4-0	134 95	<i>Gleeful.</i>	8447	66	4-0	215 95
<i>Gleamy.</i>	8443	42	4-0	151 15	<i>Gleesome.</i>	8449	72	4-0	232 15

Above Bonds can be furnished in any length and capacity desired.

All-Wire Soldered Bond Terminals

These Terminals consist of a single All-Wire Soldered Terminal of 2-0, 3-0 or 4-0 capacity, with a stranded body which can be furnished any desired length.

All inquiries or orders for Bonds must give complete specifications as called for on page 182
For Bonding Tools see pages 208 to 214.

Rail Bond Compressor

For Tee and Girder Rails



THE principal point of difference in this Compressor, as compared with the old style listed in previous catalogues, is the cup-pointed screw, and the fact that the steel used is of the highest quality, the Compressor point and end of the outer screw being hardened.

It is very substantially constructed of the best materials throughout, and has proved to be the most all-around satisfactory device of its kind on the market. It is of the compound screw type, the outer screw serving to press the terminal of the bond tightly against the web of the rail, after which the inner screw is tightened up by means of a long wrench, expanding the terminal firmly in the rail, the cup point producing a finished button on the projecting end of the terminal which greatly improves the appearance of the bonds after being installed.

The Extra Small Size is designed especially for mine and industrial work, and is furnished without the hand wheel, while the other three sizes are furnished with the hand wheel as shown in the illustration.

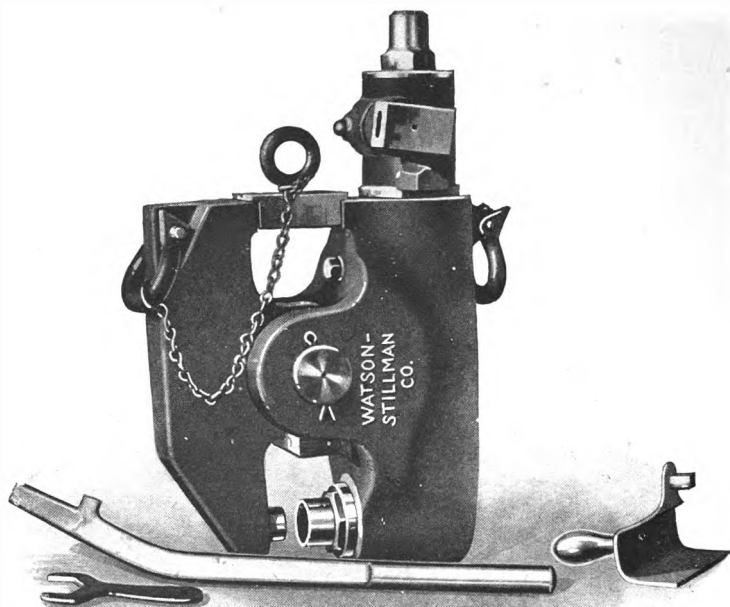
All Compressors are supplied with Wrenches unless otherwise specified.

Code Word	No.	Net Each
<i>Glorify.</i>	9982—Extra small size, for Tee Rails only, 3 inches or less in height	\$22 50
<i>Glosser.</i>	5437—Small " " " " 5 " "	25 00
<i>Glossy.</i>	5438—Medium size for Tee or Girder Rails, 7 " "	30 00
<i>Glover.</i>	5439—Large " " " " over 7 inches in height	35 00
<i>Glumly.</i>	5209—Wrench, for extra small Compressor, only	2 00
<i>Glutton.</i>	8303— " " small, medium and large Compressors	3 00

Prices for Compressors given above include Wrench.

Hydraulic Rail Bond Compressor

For Tee Rails



THE Hydraulic Rail Bond Compressor is recommended for compressing the terminals of All-Wire Rail Bonds, and its heavy compressing power insures a perfect contact between the bond terminal and the rail. It is very compact and may be quickly and easily applied to and removed from the rail.

The Compressor frame is cast from the best grade of steel and attached to it is a hydraulic pump operated by a lever which is very convenient to handle.

The Compressor as listed on the opposite page is furnished complete with a position gauge, wrench and operating handle.

Hydraulic Rail Bond Compressor

For Tee Rails

Continued

THE gauge is used to locate the Compressor at the proper point on rail so that the Compressor ram will engage the center of the bond terminal without it being necessary to look underneath the top of the rail when setting the Compressor. The gauge is placed upon the rail with a pin inserted in the bond hole and a chalk mark is placed upon the upper surface of the ball of the rail to indicate where the Compressor is to be placed.

Surrounding the Compressor ram is a sleeve or collar, which is forced out by a spring and pushes the head of the bond into close contact with the web of the rail. The body of the Compressor ram is cup-shaped and tends to confine the copper of the terminal and causes it to be forced directly into the hole of the rail instead of permitting it to spread over the web of the rail outside of the bond hole.

In applying the Compressor the block at the upper end of the jaws is removed, thus permitting opening the jaws at the lower end as the Compressor is placed in position. The jaws are then closed and the block replaced. This arrangement permits a quick application and removal of the Compressor from the rail and reduces the necessary travel of the ram to a minimum.

The jaws of the Compressor open to a width of $3\frac{1}{2}$ inches and the height of the opening above the center of the Compressor ram is $3\frac{1}{2}$ inches.

It is suitable for Tee rails of from 60 to 100 pounds A. S. C. E. section, inclusive.

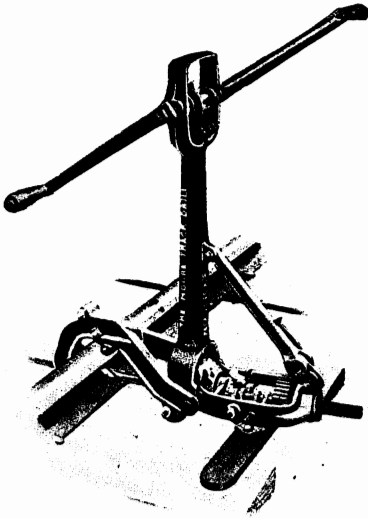
In the smaller sizes of rails where the Compressor would not rest upon the top of the ball of the rail a metal block of suitable thickness can be placed between the rail and the top of the jaws, thus adjusting the Compressor ram to a proper height to coincide with the center of the bond terminal.

The weight of the Compressor is 175 pounds.

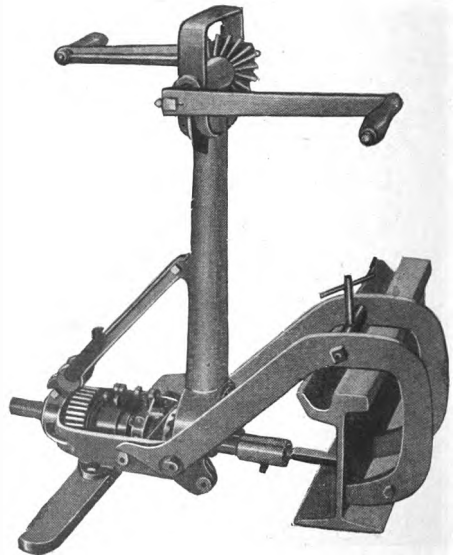
Code Word	No.	Net Each
Globe.	10470—Compressor, 25-ton capacity.....	\$150 00

Moore Track Drills

For Tee and Girder Rails



Cat. No. 10133. For Tee Rails



Cat. No. 10134. For Girder Rails

Moore Track Drills

For Tee and Girder Rails

Continued

THE Moore Track Drill is designed for heavy and severe work. It is built along entirely original lines that will be greatly appreciated and will meet the most exacting requirements. It is superior in every respect to anything that has ever been placed on the market up to the present time.

The Drill is made with a detachable upright or standard, which is quickly erected and rigidly secured to the frame by the shifting of one lever, and can be instantly released by it.

The upright and rail hooks can be removed to allow trains to pass, and quickly replaced, ready to continue drilling, *without disturbing the drill*. It cannot become stuck or wedged, so as to prevent removing of the standards.

When separated it can be easily carried by one man, one part in each hand, which is not possible with any other track drill, and it is arranged compactly for storage or transportation.

The Moore Track Drill is adapted for services under any and all conditions, and can be used where other drills cannot be used, such as in yards, bridges, tunnels, fills, cuts, etc.

Catalogue No. 10133 weighs 60 pounds; Catalogue No. 10134, 65 pounds, and both styles are designed for drilling holes up to $1\frac{1}{4}$ inches.

The Drill is regularly furnished complete with a standard chuck which takes a $\frac{5}{8}$ -inch uniform round shank twist drill.

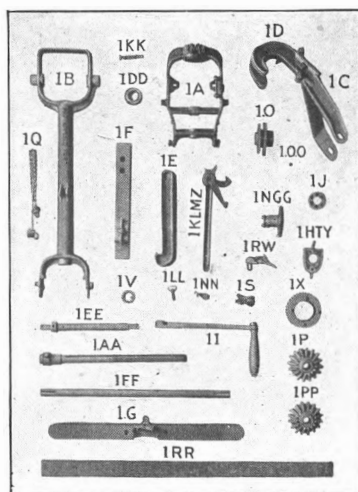
A $\frac{3}{8}$ -inch bit is also included.

Code Word	No.	Net Each
<i>Gnarled.</i>	10133—Drill for Tee Rails, with Standard Chuck.....	\$20 00
<i>Gnawer.</i>	10134— “ Girder “ “ “ “ “	25 00

See List of Parts on the following page.

Moore Track Drills

List of Repair Parts



For Cat. No. 10133 Drill

Code Word	No.	Part	Net Each
Gobbler.	10135	1A	Base with Feed Bracket Pin and Bolt.....\$2 75
Goblet.	10136	1B	Upright Frame.....3 30
Goblin.	10137	1C	Rail Hook Arm, R. and L. (2 per set).....90
Goggled.	10138	1D	" " for Standard Rail.....65
Gondola.	10139	1G	Foot Plate.....55
Goodly.	10140	1HTY	Shifting Lever, complete.....1 40
Goodness.	10141	1I	Crank with Wood Handle and Bolt (2 per set).....1 10
Gopher.	10142	1J	Ball-Bearing Adjusting Nut.....1 10
Gorged.	10143	1KLMZ	Back Brace, complete.....1 40
Gorgeous.	10144	1NGG	Clutch Flange and Spring.....1 20
Gosling.	10145	1O	Feed Nut.....1 40
Gossip.	10146	1P	Gear for Spindle with Key, 1 1/8-inch Bore.....55
Gothic.	10147	1RW	Feed Lever with Link and Pin.....55
Gowned.	10148	1S	" Bracket with Roll and Stud.....35
Grabber.	10149	1V	Clutch Collar and Key.....55
Gracious.	10150	1X	Feed Nut Case.....85
Gradely.	10151	1AA	Spindle with Set Screw.....2 75
Gradient.	10152	1DD	Ball-Bearing Race (2 per set).....1 10
Graduate.	10153	1EE	Crank Shaft with Collar.....85
Grainer.	10154	1FF	Vertical Shaft, Keyseated.....1 10
Graining.	10155	1KK	Clutch Collar Spring and Bolt.....20
Grammer.	10156	1LL	Feed Adjusting Screw.....30
Granary.	10157	1NN	" Dog.....30
Grandeur.	10158	1OO	1/8-inch Steel Ball (16 per set).....55
Grandly.	10159	1PP	Gear, 1/4-inch Bore, Keyseated (3 per set).....1 65
Grange.	10160	1IG	Feed Dog Spring.....15

For Cat. No. 10134 Drill

The above parts are for use with Drill for Girder Rails also, with the exception of the Rail Hook which is listed below:

Granule.	10161—High Rail Hook for Girder Rails.....\$2 75
----------	--

Uniform Round Shank Twist Drills

Regular Grade Steel



Shank, $2\frac{1}{4}$ inches long, approximately $\frac{5}{8}$ of an inch in diameter (actual diameter .647 of an inch). Length of drill 6 inches.

Code Word	No.	Diameter Inches	List Each	Code Word	No.	Diameter Inches	List Each
<i>Graphic.</i>	2946	$\frac{9}{32}$	\$0 73	<i>Grazing.</i>	2960	$\frac{3}{8}$	\$1 20
<i>Grapnel.</i>	2952	$\frac{15}{32}$	93	<i>Greaser.</i>	2961	$\frac{1}{4}$	1 25
<i>Grapple.</i>	2953	$\frac{1}{2}$	95	<i>Greedily.</i>	2964	$\frac{7}{8}$	1 40
<i>Grasper.</i>	2955	$\frac{9}{16}$	1 00	<i>Greenery.</i>	2965	$\frac{3}{4}$	1 45
<i>Grated.</i>	2956	$\frac{19}{32}$	1 03	<i>Greening.</i>	2968	$\frac{13}{16}$	1 70
<i>Gratuity.</i>	2957	$\frac{5}{8}$	1 05	<i>Grenade.</i>	2969	1	1 80

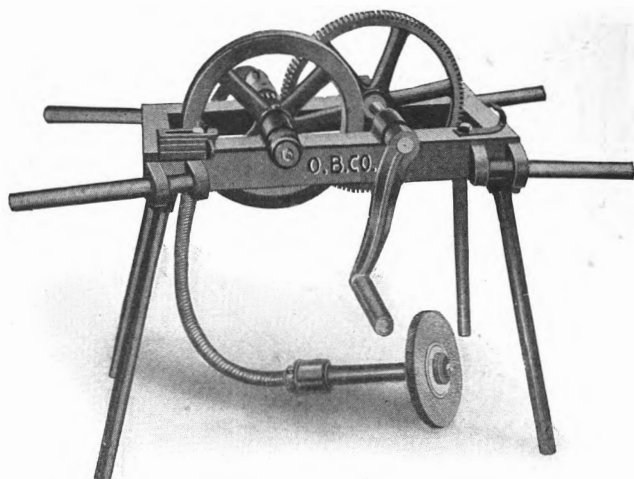
Tapered Reamers



THESE Reamers are made with six flutes, and are especially adapted for reaming high carbon steel rails. They are provided with a straight shank $\frac{1}{4}$ of an inch in diameter and $2\frac{1}{4}$ inches long. The length of the Reamers is 6 inches.

Code Word	No.	List Each
<i>Grewsome.</i>	8160— $\frac{5}{8}$ inch, for Reaming $\frac{9}{16}$ -inch holes.....	\$4 80
<i>Griddle.</i>	8164— $\frac{3}{4}$ " " " $\frac{11}{16}$ " "	5 10
<i>Gridiron.</i>	8225— $\frac{7}{8}$ " " " $\frac{13}{16}$ " "	5 85

Hand Power Grinding Machine



THE Hand Power Grinding Machine illustrated above is our latest design, and is intended to grind and polish the surface of rails before placing bonds in position. The machine is simple, compact and substantial in construction, and is light in weight, so that it can be readily carried by two men from place to place, as required.

This machine is superior in that the frame is now made entirely of iron, making it much more substantial than the old style. The shaft with which it is provided consists of two special steel spring wire coils, close wound, one being inside the other. At each end of the shaft a coupling is provided, one fitting the countershaft of the machine and the other the emery wheel arbor. The shaft is more flexible and easier to handle than the one previously used, and much more durable. The countershaft is equipped with a device for truing up the emery wheel when it becomes elliptical, and the frame of the machine is provided with a support on which the dressing tool is held, thus making the operation very simple and easy.

Code Word No.

Net Each

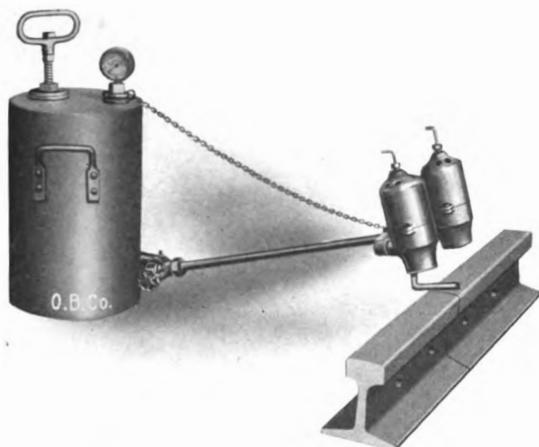
Grieve. 8718—Machine, complete with Flexible Shaft (without Emery Wheel) ..\$30 00

Grimace. 8719—Flexible Shaft, complete for Hand Power Grinding Machine..... 20 00

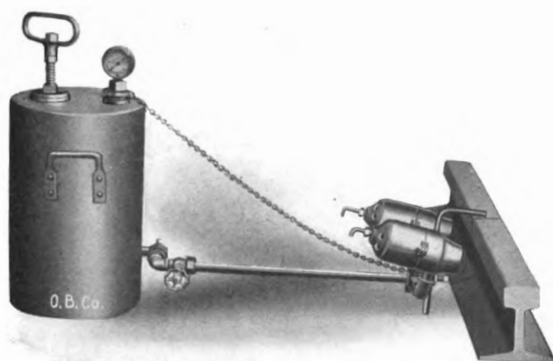
Grimily. 8210—Emery Wheel, 8-inch diameter, $\frac{3}{8}$ -inch face..... 90

Improved Duplex Blow Torch

Adjustable Burners



Torch in position to heat ball of rail



Torch in position to heat web of rail

See following page for description and list.

Improved Duplex Blow Torch

Continued

THE Improved Duplex Blow Torch illustrated on the preceding page is the result of several years of experience in the manufacture of a torch for rail bonding purposes. In the design of this improved Torch we have combined the details which experience has taught us are the best, and the result is we are now offering a Torch for rail bonding work which will heat the rail very rapidly, with a minimum consumption of gasoline.

The burners of this Torch are of the coil type and the coils are surrounded with suitably shaped castings which protect the generating surfaces from the wind and at the same time direct the flame properly onto the rail surface. The coils on the burners, together with the branch castings, have a large opening for the passage of the gasoline and if clean gasoline is used it will be practically impossible for the branch castings or the coils to become clogged.

The small needle valve on each burner is arranged to keep the small hole in the outlet clean and if this outlet should be clogged by some slight sediment in the gasoline it merely requires the closing of this needle valve to force the dirt out of the small opening and the burner will be ready for use. Either burner can be controlled independently of the other. After the burners are once started, the generating coils well heated and a good pressure is in the tank, it is practically impossible for anything but an exceptionally high wind to blow out the flame. The pump is always ready for use without opening any valve and the entire construction is so simplified, and at the same time strengthened, that if a slight degree of care is taken in handling it, the chances of breakage are very slight.

Code Word
Grinner.

No.

9308—Blow Torch, Complete.....

Net Each
\$23 00

Bonding Clamps

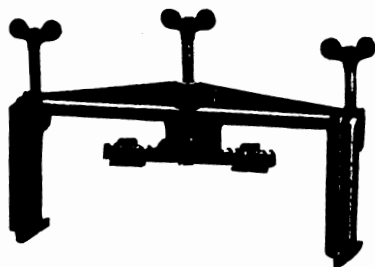
For All-Wire Soldered Rail Bonds



No. 8214—Clamping Tool for Type GA, Form 1, Bonds

THIS Clamp is for use in applying Type GA, Form 1, Soldered Bonds to the under side of the base of the rail and is a very convenient tool for this purpose.

Code Word	No.	Net Each
Gristle.	8214—Clamping Tool for Type GA, Form 1, Bonds	\$1 50



No. 10017—Clamp for Type GA, Form 2, Bonds

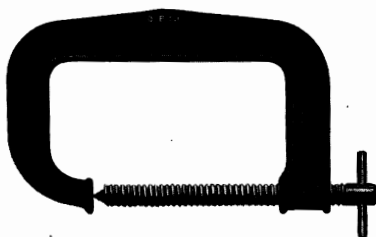
THIS Clamp possesses a number of advantages over the old form listed in previous Catalogues, and may be rigidly attached to the rail by means of the two outside set screws, thus leaving both of the operator's hands free to adjust the bond and secure it on the rail with the clamping piece, which is adjustable and will fit all standard sizes of Type GA, Form 2, Bonds. The frame is made of malleable iron and is suitable for use on standard Tee rails of weights up to and including 100 pounds per yard, as well as on the majority of standard Girder and Grooved rails.

Code Word	No.	Net Each
Gritty.	10017—Clamp for Type GA, Form 2, Bonds.....	\$2 25

Bonding Clamps

For All-Wire Soldered Rail Bonds

Continued

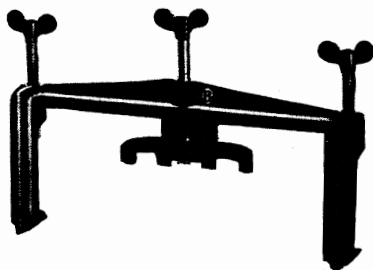


No. 8450—Clamp for Type HL Bonds

This Clamp is used in the application of the Type HL Soldered Bonds.

Code Word
Grizzle.

No.	Net Each
8450—Clamp for Type HL Bonds.....	\$1 50



No. 10018—Clamp for Type GD, Form 1, Bonds

THIS Clamp is similar to the one described above with the exception that the clamping piece is made to conform to the Type GD Bonds.

Code Word
Groanful.

No.	Net Each
10018—Clamp for Type GD, Form 1, Bonds.....	\$2 25

Rail Bond Test Bars

For Types GA, Form 2, and GD, Form 1, Soldered Bonds



BY means of the Test Bar a direct determination can be made of the mechanical strength of the soldered contact between each bond terminal and the rail. It can be used during installation as soon as the terminals of a bond have cooled off, and therefore affords an opportunity of testing at a time when it would be most convenient to resolder any joints that prove defective.

It is strongly recommended that Test Bars be used in all cases, and the final results on any one installation will more than pay for the time spent in making the tests and its use is a form of insurance that *every* soldered bond has been installed to stay, and eliminates any chance of defective work being overlooked.

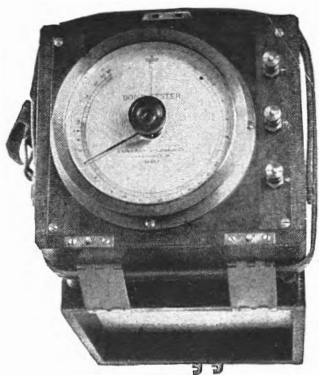
The actual operation of testing is quickly and easily performed and consists of simply submitting each bond terminal to a mechanical strain of a predetermined number of pounds. The strength of the pull, in pounds, may be readily ascertained by the operator, on the scale which constitutes a part of the device.

Full instructions for testing are furnished with each Test Bar.

The Test Bar, as listed, is made in two forms, one for use with the Type GA, Form 2, and the other for use with the Type GD, Form 1, All-Wire Soldered Rail Bonds. This tool cannot be used with any of the other types of All-Wire Bonds.

Code Word	No.	List Each
Groomer.	10039—Test Bar for Type GA, Form 2, Bonds	\$16 25
Groper.	10040— " " " " GD, " 1, " "	15 00

Roller Direct Reading Bond Tester



THE salient features of the Roller Rail Bond Tester may be summed up briefly as follows: it shows the *resistance* of the bond under test *directly on a scale*, preferably expressed in terms of the number of feet of length of uncut rail whose resistance equals that of the bond. It is also capable of showing *instantaneously* whether the bond resistance is *above* or *below* any predetermined value. *Only one operator* is required to take the readings, and the device is so light and compact that it may be carried about for long periods by the observer without fatigue. Readings of great accuracy are obtained by the use of a large scale, the length of which is nearly 15 inches, arranged in circular form. The instrument itself is compact, measuring only $5\frac{1}{4} \times 8\frac{1}{4} \times 7\frac{1}{2}$ inches over-all, and weighs but 6 pounds. The contact bar, which accompanies the Bond Tester, is so arranged that it can be folded into a compact package measuring about $1\frac{1}{2} \times 3 \times 36$ inches. The range of the Tester includes a resistance from zero up to an equivalent of a length of 30 feet of rail. This instrument can be used only when current is flowing through the rails.

Code Word
Grotto.

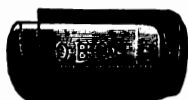
No.

8608—Bond Tester, including Instrument, Carrying Strap,
Contact Bar and Cords, Complete

List Each

\$80 00

Channel Pins



THESE Channel Pins are tapered on one end so that they may be easily started in the rail, and are slightly larger than the hole in the rail so that when seated they compress tightly on the wire and make a firm and solid joint.

The method of manufacturing these Pins results in turning out pins which are exactly uniform in length, taper and depth of slot, thereby making them very much superior to any other pin now on the market.

For temporary bonding, as in the case of new electric roads under construction, they afford a quick and efficient means of obtaining a good electrical circuit in temporary tracks and sidings.

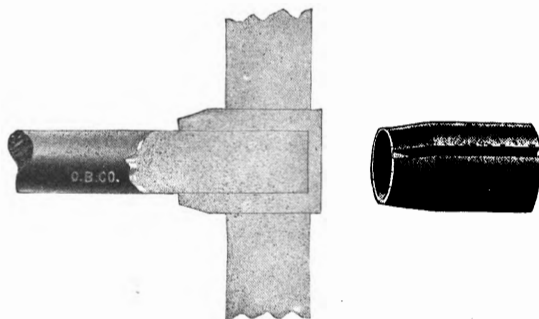
In mines using electric haulage, where it is often necessary to shift some section of track, and where it is impossible to install other bonds, the Channel Pin affords a cheap and efficient form of bonding.

Where power stations use a narrow-gauge track and small motor cars for handling coal and ashes, the Channel Pin offers a good and inexpensive method of bonding rails.

Code Word	No.	Size of Wire	Diameter of Pin	Diameter of Hole in Rail	List per 1000
<i>Grouper.</i>	1272	0	19-32 in.	9-16 in.	\$23 60
<i>Grouser.</i>	8765	0	21-32 "	5-8 "	29 10
<i>Growable.</i>	2684	2-0	19-32 "	9-16 "	25 00
<i>Grower.</i>	7546	2-0	21-32 "	5-8 "	26 25
<i>Grudge.</i>	1861	2-0	3-4 "	23-32 "	29 90
<i>Gruffy.</i>	8767	2-0	25-32 "	3-4 "	35 25
<i>Gruiter.</i>	8769	4-0	3-4 "	23-32 "	35 90
<i>Guardage.</i>	4500	4-0	25-32 "	3-4 "	38 25

Steel Bonding Caps

Patented



THE Steel Bonding Cap, as the name signifies, is a metal cap which fits snugly over the end of the bonding wire and in the web or base of the rail. The metal in the Steel Caps is a soft, pliable quality of steel of high conductivity.

The method of using the Bonding Cap is as follows: the end of the bonding wire is passed through the hole in the rail, which is drilled slightly smaller than the outside diameter of the Cap; the Cap is then placed on the wire and entered in the rail. A few blows from a hammer fasten it into place. The crimp extending the full length of the Cap allows the shell to compress firmly over the wire, and into the rail, making a perfect air and moisture proof joint. In drilling the rail, care should be taken to make the hole the exact size to properly fit the Cap, and to remove the sharp edge from the entering side of the hole so as to give the Cap free entry. It is advisable, whenever possible, to drill the rail from the side from which the Cap is entered.

For cross-connecting and special bonding, the Steel Bonding Caps made in the various sizes listed, are furnished open at both ends, so as to allow the bonding wire to pass entirely through them.

Steel Bonding Caps

Patented

Continued

Code Word	No.	Size of Bonding Wire B. & S. Gauge	Diameter of Cap	Diameter of Hole in Rail	List per 1000
<i>Guardian.</i>	1850	No. 4-0	20-32 in.	19-32 in.	\$30 00
<i>Gudgeon.</i>	4490	" 2-0	21-32 "	5-8 "	31 25
<i>Guesser.</i>	1851	" 2-0	19-32 "	9-16 "	39 40
<i>Guidable.</i>	1259	" 2-0	17-32 "	1-2 "	36 75
<i>Guileful.</i>	4491	" 0	21-32 "	5-8 "	31 25
<i>Guiltily.</i>	1852	" 0	19-32 "	9-16 "	39 40
<i>Guinea.</i>	1853	" 0	17-32 "	1-2 "	36 75
<i>Guitar.</i>	1260	" 0	15-32 "	7-16 "	35 00

Caps to fit Rails already drilled furnished to order.

$\frac{1}{2}$ of an inch is allowed for a driving fit.

Steel Cross-Connecting Bonding Caps

Patented

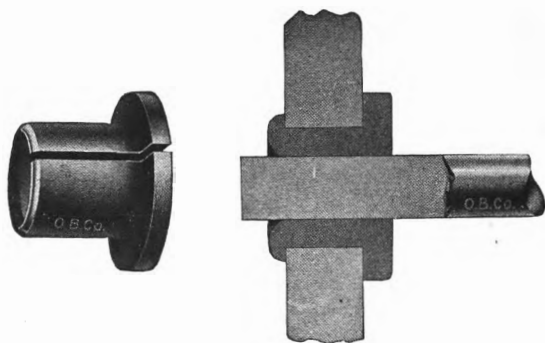
Code Word	No.	List
<i>Gumption.</i>	2682—Steel Cross-Connecting Bonding Caps, extra per 1000.....	\$8 75
<i>Gutteral.</i>	3163—Driving Tool, each	3 95

When ordering Driving Tool state size of Wire with which it is to be used.

Caps to fit Rails already drilled furnished to order.

$\frac{1}{2}$ of an inch is allowed for a driving fit.

Copper Bonding Sleeves



THESE Sleeves are made of a special copper alloy of great ductility and low resistance, and when used with copper wire, make a good electrical and mechanical connection offering extremely low resistance to the current. They consist of a hollow slotted sleeve having a flange at one end, and the other so shaped that when the Sleeve is driven into place in the rail it may be upset to form a head or shoulder on the opposite side of the rail. The hole in the rail is drilled $\frac{1}{2}$ of an inch smaller than the outside diameter of the Sleeve so that when the Sleeve is driven into the rail it compresses over the wire, binding it firmly in place. In addition to regular bonding, these Sleeves are equally well adapted to cross-connecting and special bonding, as the bond wire extends entirely through the Sleeve.

To properly install these Sleeves a set of three special tools is required: i. e., Drift Punch, Driving and Upsetting Tools. The Drift Punch is intended to remove any burrs around the edge of the hole in the rail which may be left by the drill. It is driven lightly into the hole from the same side that the Bonding Sleeve is to enter. The Sleeve is then inserted in the rail and driven home by means of the Driving Tool. One end of the latter is slotted to allow it to clear the bond wire. After the Sleeve is in position the Upsetting Tool is applied to the tapered end of it to form a head or shoulder against the rail. A hole is provided in the end of this Tool to give clearance to the projecting end of the bond wire.

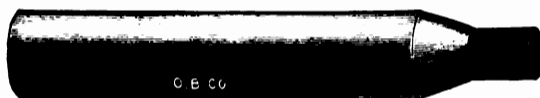
Copper Bonding Sleeves

Code Word	No.	Size of Bonding Wire B. & S. Gauge	Diameter of Sleeve	Diameter of Hole in Rail	List per 1000
<i>Gunner.</i>	3149	No. 4-0	25-32 in.	3-4 in.	\$121 50
<i>Gunster.</i>	3156	" 2-0	21-32 "	5-8 "	101 00
<i>Gurgle.</i>	4498	" 2-0	19-32 "	9-16 "	86 00
<i>Gusher.</i>	3158	" 0	21-32 "	5-8 "	107 85
<i>Guttate.</i>	3160	" 0	19-32 "	9-16 "	95 00

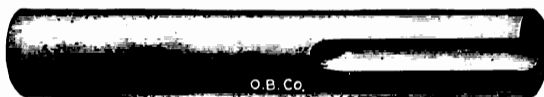
Sleeves to fit Rails already drilled furnished to order.

$\frac{1}{2}$ of an inch is allowed for a driving fit.

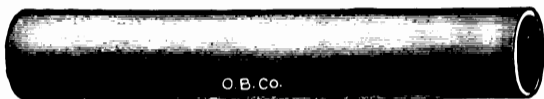
Copper Sleeve Bonding Tools



Drift Punch



Driving Tool



Upsetting Tool

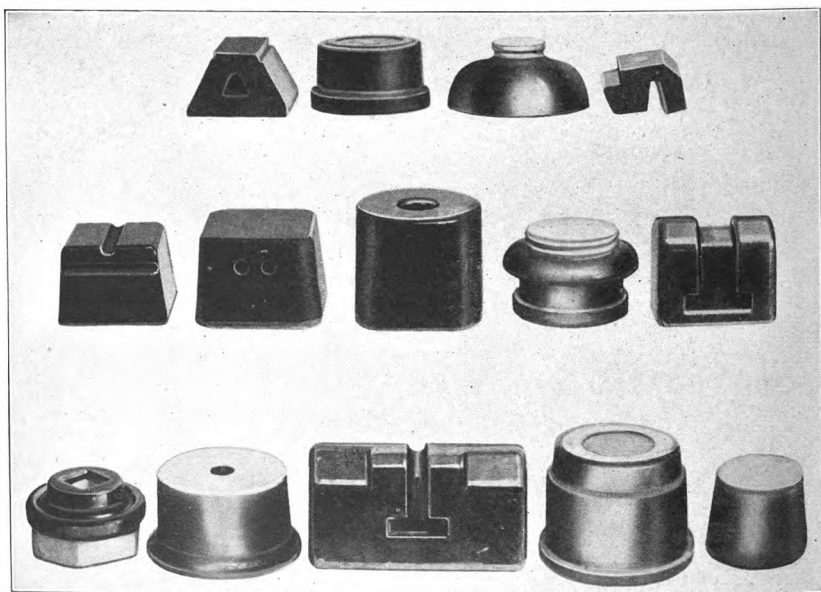
Code Word	No.	List Each
<i>Gutti fer.</i>	3162—Drift Punch.....	\$2 60
<i>Guttal.</i>	3163—Driving Tool.....	3 95
<i>Gymnast.</i>	3164—Upsetting "	2 60

When ordering Drift Punch state size of hole in Rail and when ordering Driving Tool or Upsetting Tool give size of Wire with which they are to be used.

Third Rail Insulators

General Description

PRESENT railway conditions seem to indicate that there will be a steady and increasing demand for Third Rail Insulators, for the reason that under certain well-defined conditions the third rail system possesses marked advantages over other systems of distribution. As a general proposition, it may be stated that the success of third rail systems from a practical and engineering standpoint has already been established by the



O-B Third Rail Insulator Blocks, showing variety of designs

relatively large number of installations on which this system is now in use. This success, however, in any case may be said to depend almost entirely on the type of insulator which is used, as, aside from the electrical features of the insulator supporting the third rail, all other considerations are entirely of a mechanical nature, and present no serious difficulties from an engineering standpoint.

Third Rail Insulators

General Description—Continued

In the design of O-B Third Rail Insulators three very essential elements have been given due consideration: First, the metal part to act as a guide or means for limiting the lateral movement of the rail with respect to the insulator block; second, metal parts for attaching the insulator to the tie, and, most important of all, the insulator block separating the metal parts.

As the result of our long experience, not only in the manufacture, but in observing the performance of our various types of Third Rail Insulators on many of the largest third rail installations in the country, and extended experiments in using various kinds of insulating materials, we have adopted Semi-Porcelain as our standard. From the standpoint of mechanical strength, insulation and cost, Semi-Porcelain is far superior to any other material for this purpose, and (with the exception of glass and the best grades of Porcelain) is more vitreous and non-absorbent than any other. With the exception of Insulators for very light rails, in which we use Porcelain, all of our standard Insulators have a Semi-Porcelain body. Semi-Porcelain is very dense, strong and durable, takes an excellent glaze and possesses high insulating properties which do not deteriorate rapidly.

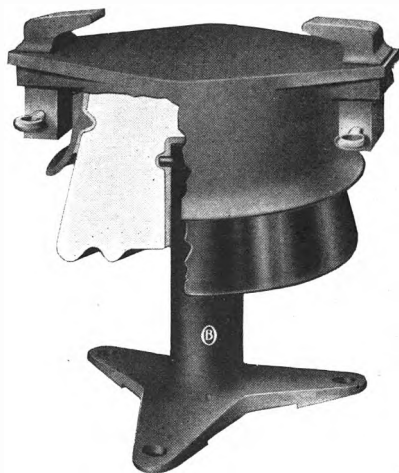
Owing to the wide range of service requirements it is not possible to list in this catalogue a complete line of standard types of O-B Third Rail Insulators, but we illustrate and describe on the following pages a few of the more popular and efficient types, and suggest that Properties contemplating the installation of Third Rail Systems take advantage of our experience and knowledge in this line and get our recommendations on the exact type best suited to meet their requirements.

In making inquiries or ordering Third Rail Insulators please give the following data: The type and form of Insulator desired; the section number or weight of feeder rail to be used; name of rail manufacturer, and vertical height of Insulator from the lower surface of rail base to the upper face of the tie.

Third Rail Insulator

Patented

Type A—Form 1



THE Type A—Form 1 Insulator illustrated above is adapted for comparatively light weight rails, and is especially recommended where a retaining device for anchoring the rail to the insulator is desired. Its design is also applicable where the rail is to be placed relatively high above the ties. The insulating medium is Semi-Porcelain and a cap casting of malleable iron is firmly cemented to the top of the insulating body, and serves to support the third rail. The latter is held in place by means of lugs on each side of the cap casting, which, while holding the former in perfect horizontal alignment, permit a sufficient vertical play or motion to obviate the trouble arising from breaking of the insulators, which has occurred in the past from the rail being secured too rigidly to the insulator.

Code Word
Fanciful.

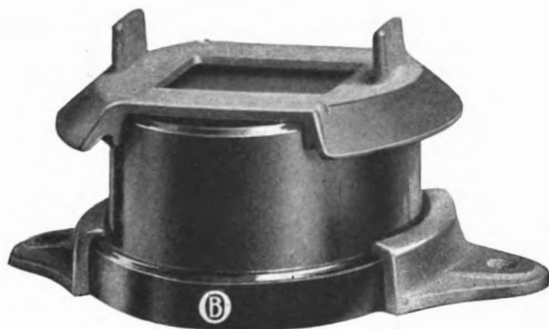
No.
3042—Third Rail Insulator.....

List per 100
\$250 00

See pages 220–221 for full description and directions for ordering.

Third Rail Insulator

Type B—Form 2



THE Type B, Form 2, Insulator is suitable for supporting the heaviest rails. The insulating medium consists of a cylindrical block of Semi-Portland Cement, which form possesses great resistance to crushing strains and is therefore recommended where the conditions are unusually severe. The insulator block is securely held in place by means of two malleable iron lug castings lagged to the supporting tie. A malleable cap casting rests on the top of the insulator block and supports the rail. This casting has a downwardly projecting flange which engages the top of the insulator block, and there are also two vertical lugs between which the rail rests. Thus the rail is held securely in horizontal alignment, but is permitted a certain amount of vertical movement so that the Insulator is not subjected to strain due to the depression of the supporting tie by a passing train.

This design is particularly adapted for use where the third rail must be kept relatively close to the supporting tie.

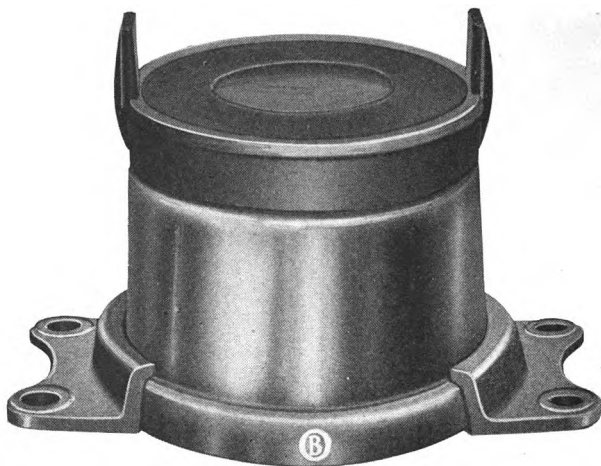
Code Word
Fanatic.

No.	List per 100
8005—Third Rail Insulator.....	\$175 00

See pages 220-221 for full description and directions for ordering.

Third Rail Insulator

Type B—Form 3



THE Type B, Form 3, Insulator illustrated above is similar to the Type B, Form 2, shown on the preceding page. The chief difference is that the rail is held in position by means of a loose malleable iron ring casting which fits over the block and is provided with two upwardly projecting lugs which engage the rail base. The rail base is held in correct alignment by these lugs and rests directly on the upper surface of the insulator block.

In the Type B Insulators the castings are not cemented to the Semi-*Porcelain* and thus the replacement of an Insulator, accidentally broken, can be made very readily.

Code Word
Fancier.

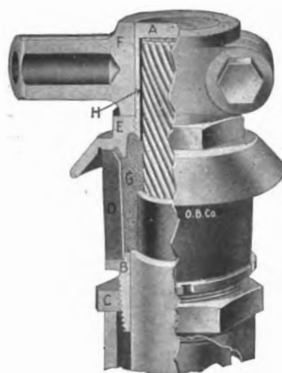
No.
10496—Third Rail Insulator.....

List per 100
\$175 00

See pages 220–221 for full description and directions for ordering.

Cable Terminal Insulator

Patented



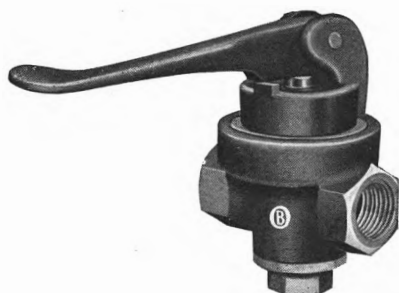
THIS device is used at grade crossings and yard switches for connecting the Third Rail to underground cables. It is practical, efficient and easily installed. The illustration shows a design for the 500,000 C. M.; the other capacities vary simply in the part "F," which is provided for greater capacity. All metal parts are of bronze. The cap "A" is soldered to the end of the cable. The sleeve "B" is then placed in position and the nut "C" tightened up, clamping "B" tightly to the lead sheath. The "Dirigo" insulating sleeve "D" is then placed in position and the space within filled with hot insulating compound "G." The cap "E" is then screwed into place and forces the hot compound into all space within the Insulator. After having soldered the connecting cables to the Third Rail in place, the terminal "F" is clamped in position on the cap "A." The terminal "F" can be removed easily at any time to make tests. *In ordering always give exact outside diameter of copper core and lead sheath.*

For connecting the Terminal to the rail use the Soldered or Compressed Bond Terminals listed on pages 200 and 195, respectively.

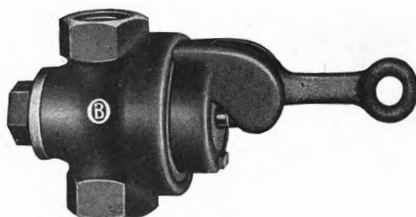
Code Word	No.	List Each
<i>Fangle.</i>	8011—Insulator for 500,000 C.M. Cable.....	\$ 8 75
<i>Farantly.</i>	9305— " " 1,000,000 " "	10 00
<i>Farming.</i>	9306— " " 1,500,000 " "	13 75
<i>Farness.</i>	9307— " " 2,000,000 " "	17 50

O-B Air Sander and Whistle Valve

Diaphragm Type—Patent Applied For



Sander Valve with Handle, Nos. 10568-10569



Whistle Valve, No. 10570

THIS Valve possesses an *exclusive* feature which will be instantly appreciated in that it has a flexible bronze diaphragm between the valve stem and the plunger which opens the Valve, rendering it *absolutely leakless* when being operated and doing away with the necessity of packing, and therefore makes the Valve easier to operate. The same valve body may be used for either sander or whistle service, simply using different operating handles as shown in the illustrations above.

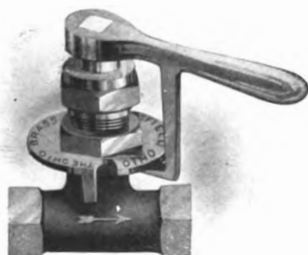
The clevis to which the operating handle is attached can be rotated with respect to the valve body so that it can be turned in any desired position. This makes it possible to install the Valve at either side of the engineer's valve and turn the operating handle so that it is immediately over the engineer's valve handle in cars where there is not sufficient clearance to install the Sander Valve directly in front of the engineer's valve.

When it is desired to operate both Sander and Whistle Valves with the same hand which operates the engineer's valve, two of the Sander Valves, Cat. No. 10568, can be connected together with a tee tapped into the main air line and the handles adjusted to come directly over the top of the engineer's valve or arranged with one handle on each side of the engineer's valve handle, one of the Valves being used to operate the air sander and the other connected to the whistle. The handle of the Whistle Valve is permanently attached and arranged so that the whistle cord can be secured to it while the handle of the Air Sander Valve is removable.

The Valve is made from high grade bronze and neatly finished. Is absolutely leakless and can be depended upon to give satisfactory service. The inlet and outlet openings are tapped for one-half inch iron pipe.

Code Word	No.	List Each
Flutter.	10568—O-B Air Sander Valve, without Handle.....	\$5 00
Fluvial.	10569—Operating Handle, only	62
Flying.	10570—O-B Whistle Valve, with Handle	5 62

Independent Air Sander Valve



THIS Valve is used in connection with the O-B Sand Trap when the emergency feature possessed by the O-B Valve is not desired. It may be connected into the piping at any point convenient to the motor-man, and is so constructed that a slight movement of the handle to the right will cause a flow of sand. By turning the handle farther to the right the flow may be increased to any desired amount. The locking plate can be adjusted to accommodate itself to wear in the valve seat, and to the different positions at which it may be desirable to set the valve. This Valve must be so connected up that the flow of air will be in the direction of the arrow.

Code Word	No.	List Each
<i>Fabulist.</i>	8280—Independent Sander Valve, without Handle, for $\frac{1}{2}$ " Iron Pipe.	\$4 25
<i>Facete.</i>	8281—Operating Handle for Independent Valve	70

Cotton and Wire Sander Hose

The Cotton and Wire Hose listed below are for use with the O-B Sand Trap shown on page 228, and are carefully selected grades especially suitable for this purpose.

Code Word	No.	List Each
<i>Facial.</i>	8284—Wire Hose, 42 inches long	\$1 85
<i>Facient.</i>	8285—Cotton Hose, 42 inches long	1 75

O-B Air Sand Trap

Patent Pending



Fig. 1

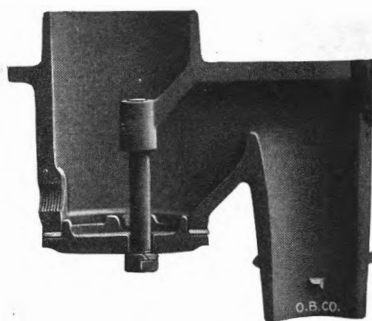


Fig. 2—Sectional View

THE O-B Air Sand Trap, shown above, is very compact, thus economizing space where it is often needed; can be placed in any convenient location on car where hose will properly reach the wheels, sand cannot get out except by an application of air, and there are no moving parts to get out of order.

The Trap consists of a one-piece casting with a removable bottom plate, which makes it easy to rid the Trap of caked or frozen sand. A rubber gasket, under the bottom plate, prevents moisture from entering the Trap.

The curved surfaces inside the Trap offer a minimum resistance to flow of sand when under air pressure and facilitate cleaning.

Width of flanged top of Trap $4\frac{5}{8}$ inches, length $6\frac{7}{8}$ inches.

Height of Trap over all from flanged top to end of hose connection $4\frac{3}{4}$ inches, weight 6 pounds.

Hole in Trap for air blast pipe is threaded for $\frac{1}{4}$ -inch iron pipe.

The Trap is regularly furnished exactly as shown in Fig. 1.

A specification blank, giving full data for ordering, will be furnished on application.

Code Word	No.	List Each
<i>Facingly.</i>	10038—O-B Air Sand Trap.....	\$6 85

For list of Air Valves, Cotton and Wire Hose, etc., see pages 226 and 227.

O-B Air Sander Equipment

A Few Suggestions for Applying

THE diagrams on the following page illustrate several ways in which the new O-B Sander Equipment may be applied to single and double end cars in order to meet various car equipment conditions. The local conditions of road and equipment in each case will largely determine the best and most suitable plan to be adopted.

FIGURE A shows a desirable method for single end cars equipped with two motors. This arrangement allows of instant application of sand to the drivers, thereby preventing the spinning of wheels when starting. This plan results in a great saving of power as applied to the motors, and it has been used in preference to equipping cars with four motors, and found to be equally as able to do the work required as a four motor equipment.

FIGURE B illustrates the usual method adopted for a two motor equipment, where the use of sand for stopping is more of a factor than as an aid in starting. This plan is intended for single end cars.

FIGURE C is an application of Figure A to double end cars.

FIGURE D shows an application of Figure B to double end cars.

FIGURE E illustrates the arrangement shown in Figure A as applied to maximum traction trucks on single end cars. It has been clearly demonstrated that this method is very efficient as a power saver on some of the large eastern roads.

FIGURE F shows the ordinary method as applied to maximum traction trucks on single end cars, but this plan is recommended only where the interior construction of the car does not allow of the Figure E plan being adopted.

FIGURE G is an application of Figure E to a double end equipment.

FIGURE H shows an application of the Figure F plan to double end cars.

FIGURE I is used on single end cars with long wheel base trucks, where it is desirable to sand the rails on curves without placing sand hoppers on the trucks. This arrangement allows of sanding the track for three sets of wheels, and is preferred as being a better arrangement than placing hoppers on the trucks, or on the other hand, not being able to sand the rails on curves. It should be noted that this plan is a marked improvement over the method usually adopted for this purpose.

FIGURE J is an application of Figure I to a double end equipment.

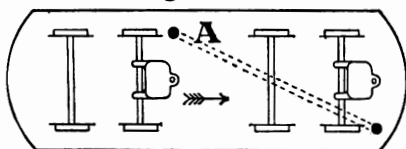
FIGURE K shows a plan of sanding the rails on very long and heavy grades.

The front sanders are used in the ordinary way, while the rear sanders are intended to take the place of a sand car, by sanding certain sections of the track which it is desirable to keep well sanded at all times, such as steep grades, or curves on grades.

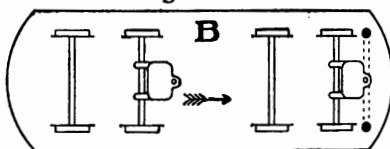
O-B Air Sander Equipment

Diagram Showing Location of Sanders

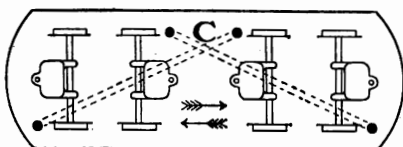
Single End Car



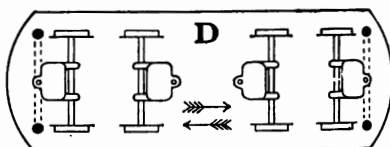
Single End Car



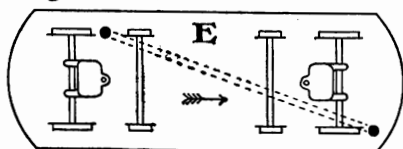
Double End Car



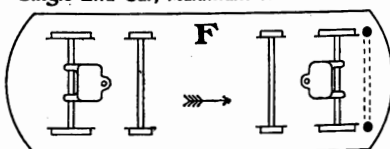
Double End Car



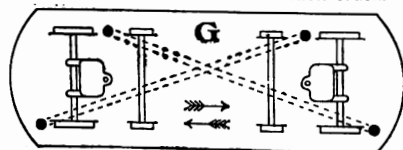
Single End Car, Maximum Traction Trucks



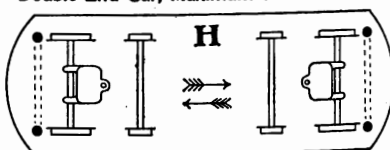
Single End Car, Maximum Traction Trucks



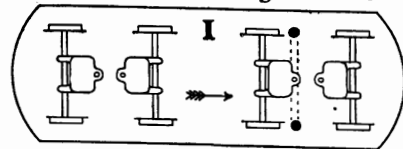
Double End Car, Maximum Traction Trucks



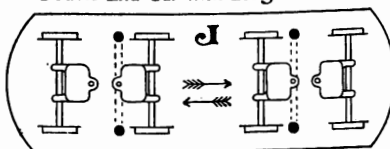
Double End Car, Maximum Traction Trucks



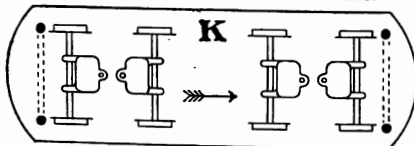
Single End Car with Long Wheel Base



Double End Car with Long Wheel Base



Single End Car with Rear Wheel Sanders

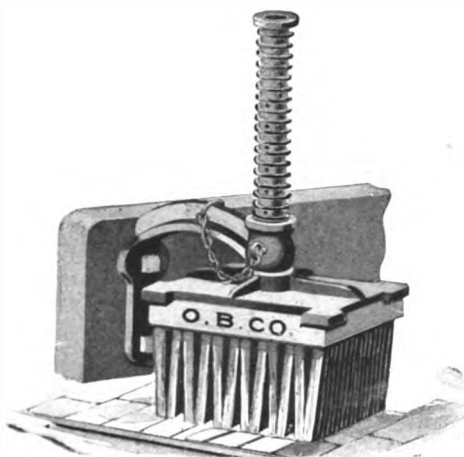


The round spots and dotted lines indicate position of Sanders and manner in which they are connected.

For description of these plans, see page 229

Adjustable Track Brush Holder

Patented



Holder for V-Shaped and Upright Guard Boards, in raised position, complete with Top Plate and Track Brush.

THE working parts of the Adjustable Track Brush Holder are few in number and simple in design, being of such a nature that they are not liable to get out of repair; no bolts, set screws or nuts being used in the adjusting parts. In the event of the cotter pin being accidentally removed or becoming useless, the elasticity of the spring lifts the broom clear of the rail and entirely out of the way of danger; the broom in this case simply failing to perform its work. The pipe standard is of sufficient length to permit the use of track brooms with varying lengths of wires, also to allow for the natural wear of them in service; the holes in the pipe being drilled closely together, and a nicety of adjustment thus provided for. The brooms are lowered on to the rail by removing the cotter pin from the Holder, then depressing the pipe standard, and inserting the pin again in whichever one of the holes in the pipe that will best give the desired tension. In raising the brooms the cotter pin is taken out and the elasticity of the steel spring lifts them clear of the rail. It is advisable, however, to lock the pipe standard so that the weight of the broom will be taken from the spring by placing the pin in the lowest hole in the pipe.

See listing on the following page.

Adjustable Track Brush Holder

Continued

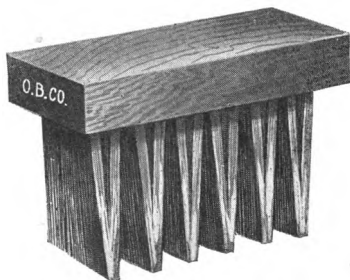
In placing the Track Brush Holders in position on the guard board they should be set so that sufficient clearance from the rail will be given to the track brooms when in the raised or "off" position, and due allowance should also be made for the wear of the steel wires of the brooms so that the pipe standard can always be depressed sufficiently to give them the required adjustment.

For sloping guard boards it will be found advisable to so change the hanger irons on them that the boards will be placed in an upright position.

Code Word	No.	List Price
<i>Faction.</i>	1821—Holder only, for V-Shaped and Upright Guard Boards.....	Per set of 4, \$17 35
<i>Faction.</i>	8045—Top Plate for No. 1552 Track Brush.....	" " 4, 3 50
<i>Factual.</i>	8047— " " 2136 " "	" " 4, 2 35

The price on Holder does not include Top Plates or Track Brushes, which must be ordered separately.

Steel Wire Track Brushes



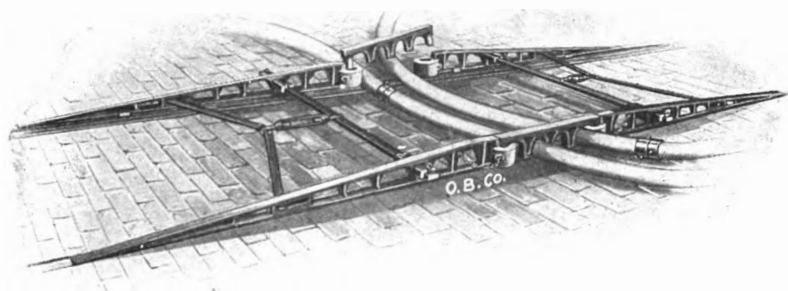
No. 2136

THESE Track Brushes are for use with the Adjustable Track Brush Holder listed above. The wire used is made from a high grade of steel, which is especially oil-tempered for the purpose. The backing in which the wires are fastened is a heavy, hard wood block.

Code Word	No.	Style	Length	Width	Length Wire	List per Dozen
<i>Facture.</i>	1552	Extra Heavy Square End	8½	6½	6	\$39 50
<i>Faculty.</i>	2136	Double Holed " "	8	4	4½	15 80

Emergency Hose Bridge

Improved Design



THIS Bridge enables cars to run over tracks crossed by fire hose.

It consists of two parallel trusses, provided with openings through which several lines of hose may be passed, and so arranged that the trusses are rigidly connected by brace rods, which are placed high enough to clear the pavement. The trusses are secured on top of the rails by lugs which project downward from the lower edge of the trusses, and rest against the side of the rail flange.

The Hose Bridge can be assembled or taken apart quickly, and when "knocked down," can be readily carried on a trouble or emergency wagon. The running surfaces have ample strength to carry any electric cars with perfect safety and the slope toward either end is gradual. Where the Hose Bridge is in use, there can be no blockades or holding of cars on account of fires and often it is not necessary to even break the regular schedule.

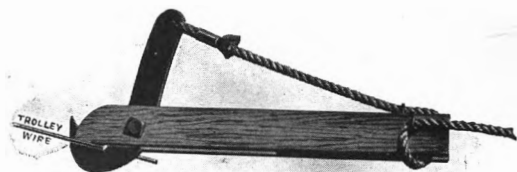
It will accommodate four or six lines of 3-inch hose.

Length of approach is 5 feet 3 inches, maximum height $4\frac{1}{2}$ inches.

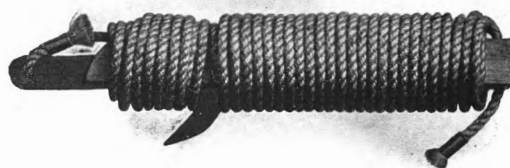
Code Word	No.	List Each
<i>Faddle.</i>	9989—Emergency Hose Bridge for four lines of Hose.....	\$150 00
<i>Fadedly.</i>	10473— " " " " six " "	175 00

In ordering Hose Bridges, state the gauge of track on which they are to be used and when for use with cars having rigid pilots, give maximum height between top of rail and pilot, also the distance from the point on the pilot which is immediately over rail, to the center of front wheels and distance between wheel centers on truck.

Trolley Wire Pick Up



Pick Up in Use



Pick Up When Not in Use

THIS device is used for picking up the ends of a broken trolley wire, which would otherwise interfere with the passage of cars or be dangerous to the public. It is very substantially constructed, the handle being made of selected oak and the end casting of malleable iron. After the wire has been picked up by means of the tongs, the rope is drawn up tight until the tongs securely grip the wire, after which the rope may be fastened by passing it through the groove and under the hook at the end of the handle, thereby securing the Pick Up to the wire. The rope is then thrown over a span wire or limb of a tree and the trolley wire pulled up out of the way.

Each Pick Up is supplied with 50 feet of $\frac{3}{8}$ -inch rope, and when not in use this may be wound tightly around the tongs, so that the device will occupy but a small space, and can readily be placed under a car seat or other convenient place, as desired. Each car should be equipped with a Pick Up.

Code Word
Fadeless.

No.

8127—Trolley Wire Pick Up.....

List Each

\$2 35

O-B Electric Car Signal System

Note:—This is an entirely new system, unlike any other, and is absolutely dependable.

AFTER a series of most exhaustive experiments and actual tests in service under all operating conditions we have succeeded in perfecting, and are now offering to the trade, an Electric Signal System which provides a simple, efficient and reliable set of signals for classification and rear end markers for electric cars, which will operate at all times regardless of whether the car is receiving energy from the line or not and so easy to maintain and operate that it can be depended upon to work satisfactorily with reasonable care on part of the trainmen and car barn men.

This signal will replace the very unsatisfactory oil lamps hitherto necessary because of the absence of a perfect electric car signal system up to this time.

The advantages of the O-B Electric System over oil may be summed up as follows:—

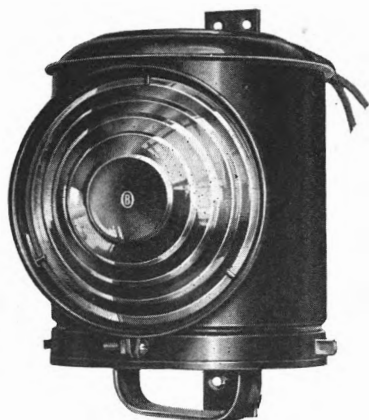
- (a) Economy of maintenance and operation.
- (b) Cleanliness, because of absence of smoke and oil. The lenses are always clean, insuring a bright clear signal.
- (c) The signals *always* burn, as the electric lights cannot jar out or blow out—a common occurrence with oil signals.
- (d) Always ready for immediate use and no time lost in starting out cars.
- (e) Absolutely no fire risk.
- (f) Permanently attached to cars so that signals cannot be forgotten—the throwing of the switch puts the signals in operation.
- (g) System can be arranged to light a pilot lamp within the car in case of failure of the main trolley current if desired. This will dimly light the car and at the same time indicate to the conductor that his signals are operating.

It is a well known fact that oil lamps are very unreliable, because they jar out or blow out quite readily. Every road has trouble from time to time with the oil used and it is found almost impossible to keep the lights burning with some of the oil received, making it necessary to doctor the oil in order to make it burn properly. The result is often a period of several days of practically no protection to the cars, because the trainmen cannot keep the lights burning.

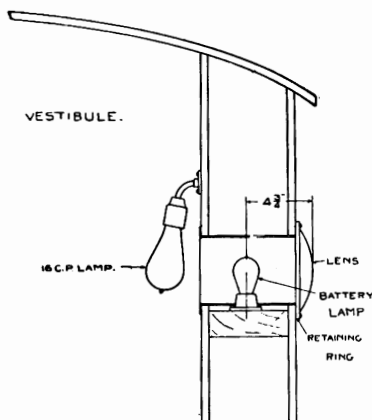
See complete listing on page 241.

O-B Electric Car Signal System

Continued



Duplex Tri-Color Lantern



Method of Using Lens and Retaining Ring

The cost of maintenance of oil signals mounts up rapidly on account of the attendance required; the oil used; the depreciation of the lanterns from rough handling; the necessity for repair parts, such as wicks, burners, lenses, etc., and loss from theft.

In the O-B System each Signal Lantern is normally illuminated by a 16 c. p. lamp connected directly to the trolley circuit. In each lantern, however, there is placed a low voltage battery lamp (see illustration on page 237) which is automatically lighted by a positive operating Relay (connected in series with the main signal lamp) in case the latter fails to burn for any reason, and this Relay (see page 241) is also adjusted to automatically cut in when the main signal lamp burns too dimly to give a clear signal.

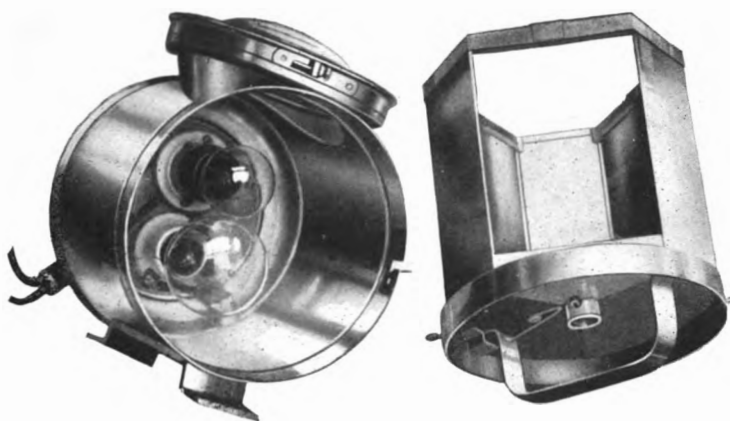
Current for lighting the low voltage auxiliary lamp is supplied by an especially designed Accumulator (storage battery) which is maintained automatically in a charged condition.

As only one circuit of 16 c. p. lamps is used to make up the main signal circuit, it is not necessary to disturb the wiring for car lighting circuits on cars already built. A 16 c. p. lamp is contained in each signal lantern so that when fewer than five signal lanterns are used there will be one or more 16 c. p. lamps available for car lighting.

See complete listing on page 241.

O-B Electric Car Signal System

Continued



Showing Interior Construction of Duplex Tri-Color Lantern

The Signal Lanterns are furnished in two styles, and the one shown in the illustration herewith, the Duplex Tri-Color Lantern, has a white semaphore lens and a color-changing device by means of which a green or red light can be produced by simply rotating a handle. The bottom of this lantern indicates what color is in use. The Duplex Ruby Lantern is similar to that shown, with the exception that it only has one ruby lens, and is not fitted with a color-changing device. The Duplex Tri-Color Lantern being adjustable so that any of the three colors may be turned into position can be used either for a classification or tail light. The Duplex Ruby Lantern is intended for use only as a rear end signal or tail light. The 5 $\frac{3}{4}$ -inch Ruby Semaphore Lens and Retaining Ring can be used in place of the Duplex Ruby Lantern if the arrangement shown in the diagram on page 236 is carried out.

Where oil signal lanterns are in use it is possible, in some cases, to change over the lanterns so as to use them for the O-B Electric Signal System at a slight extra expense.

The Accumulator was especially designed for the service requirements of this system after a long series of experiments to determine upon the features most desirable. It is 14 $\frac{1}{2}$ inches high, 8 $\frac{1}{4}$ inches wide and 11 $\frac{1}{2}$ inches long, and may be placed under an ordinary car seat. The battery jars are extra heavy hard rubber and are mounted in a strong treated

See complete listing on page 241.

O-B Electric Car Signal System

Continued

oak case with an elastic insulating compound surrounding each jar. The elements are of a special type and are capable of continuous use under the most trying service conditions. Every detail has been carefully watched in preparing this design in order that the battery be as nearly "fool proof" as possible. Expense has not been spared to attain this end, and the battery is the best that can possibly be produced.

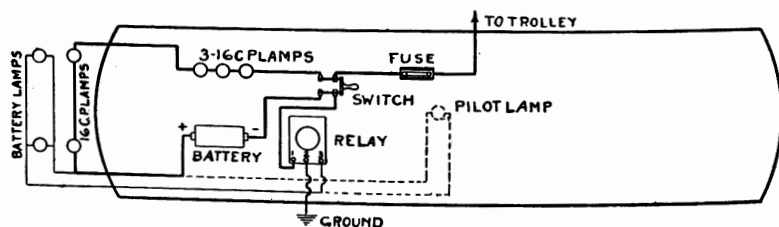
The low voltage lamps are especially constructed to withstand the vibration on electric cars, and as the filaments are tantalum a brilliant light with a minimum current consumption is assured.

Complete directions for installation have been carefully worked out so that this may be accomplished quickly and easily by anyone at all familiar with car wiring.

The following lists of materials indicate the quantities of the various items necessary for the five different combinations of signals. Each list gives complete equipment for one car.

Equipment A

For Single End Car with two Red Tail Lights only.



List of material required:

QUANTITY	ITEM	CAT. NO.
1.....	Relay.....	10453
1.....	Accumulator.....	10312
2.....	Duplex Ruby Lanterns.....	10451
2.....	Tantalum Lamps.....	10313
1.....	D. P., S. T. Switch.....	8481
1.....	Porcelain Fuse Block.....	9589
1.....	Enclosed Fuse.....	10317

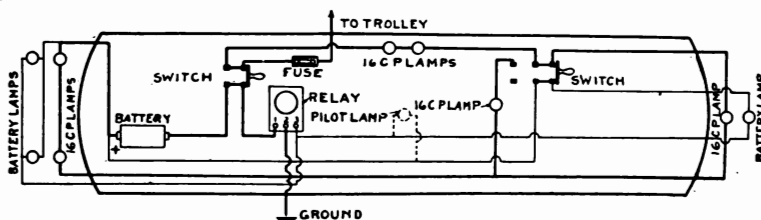
See complete listing on page 241.

O-B Electric Car Signal System

Continued

Equipment B

For Single End Car with two Red Tail Lights and one Classification Light.

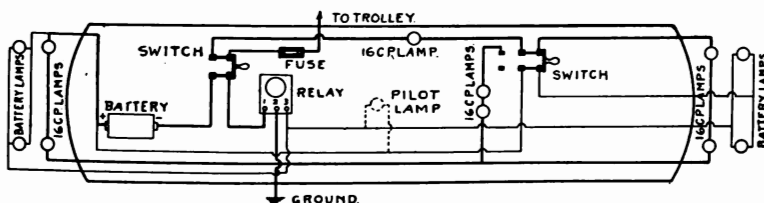


List of material required:

QUANTITY	ITEM	CAT. NO.
1.....	Relay.....	10453
1.....	Accumulator.....	10312
2.....	Duplex Ruby Lanterns.....	10451
1.....	Duplex Tri-Color Lantern.....	10452
3.....	Tantalum Lamps.....	10313
1.....	D. P., S. T. Switch.....	8481
1.....	D. P., D. T. Switch.....	10316
1.....	Porcelain Fuse Block.....	9589
1.....	Enclosed Fuse.....	10317

Equipment C

For Single End Car with two Red Tail Lights and two Classification Lights.



List of material required:

QUANTITY	ITEM	CAT. NO.
1.....	Relay.....	10453
1.....	Accumulator.....	10312
1.....	Duplex Ruby Lanterns.....	10451
2.....	Duplex Tri-Color Lanterns.....	10452
4.....	Tantalum Lamps.....	10313
1.....	D. P., S. T. Switch.....	8481
1.....	D. P., D. T. Switch.....	10316
1.....	Porcelain Fuse Block.....	9589
1.....	Enclosed Fuse.....	10317

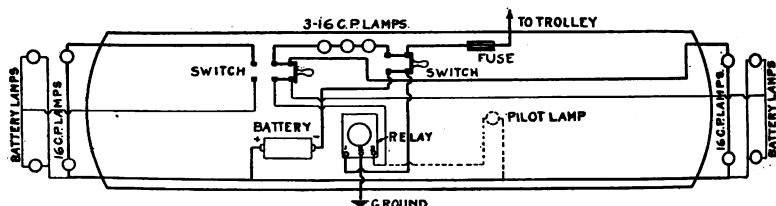
See complete listing on page 241.

O-B Electric Car Signal System

Continued

Equipment D

For Double End Car with four Red Tail Lights (two at each end).

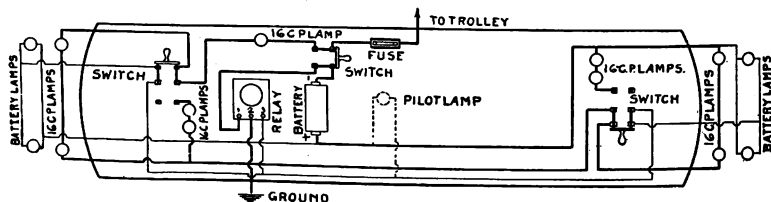


List of material required:

QUANTITY	ITEM	CAT. NO.
1	Relay	10453
1	Accumulator	10312
4	Duplex Ruby Lanterns	10451
4	Tantalum Lamps	10313
1	D. P., S. T. Switch	8481
1	D. P., D. T. Switch	10316
1	Porcelain Fuse Block	9589
1	Enclosed Fuse	10317

Equipment E

For Double End Car with four Tri-Color Lanterns (two at each end), one set to be used as Red Tail Lights and the other as Classification Lights, and vice versa.



List of material required:

QUANTITY	ITEM	CAT. NO.
1	Relay	10453
1	Accumulator	10312
4	Duplex Tri-Color Lanterns	10452
4	Tantalum Lamps	10313
1	D. P., S. T. Switch	8481
2	D. P., D. T. Switches	10316
1	Porcelain Fuse Block	9589
1	Enclosed Fuse	10317

See complete listing on page 241.

O-B Electric Car Signal System

Continued



Duplex Tri-Color Lantern. No. 10452



Relay. No. 10453

Code Word	No.	List Each
<i>Fagging.</i>	10453—Car Signal Relay.....	\$10 00
<i>Fairlance.</i>	10312— " " Accumulator.....	62 50
<i>Fairly.</i>	10451—Duplex Ruby Lantern.....	10 00
<i>Falcade.</i>	10452— " Tri-Color "	12 50
<i>Falcer.</i>	9006—Ruby Semaphore Lens and Retaining Ring.....	2 50
<i>Falsary.</i>	10313—Tantalum Lamp, 3-Candle Power, 6 Volt Ed. Base.....	1 12
<i>Fameless.</i>	8481—Knife Switch, D. P. Single Throw, 25 Amp. 250 V.....	1 32
<i>Famish.</i>	10316— " " Double " 25 " 250 V.....	2 38
<i>Famosity.</i>	9589—Porcelain Fuse Block, 600 V.....	63
<i>Famously.</i>	10317—Type B Standard, Enclosed Fuse, 1 Amp. 600 V.....	38

Suggestions for Ordering

If it is desired to install a pilot lamp inside the car connected to the battery circuit, as shown in the foregoing diagrams, to burn when the trolley current is off, one extra Tantalum Lamp should be added to the list of materials.

A 5 $\frac{3}{8}$ -inch Ruby Semaphore Lens and Retaining Ring, Cat. No. 9006, should be ordered in place of each Duplex Ruby Lantern in Equipments A, B, C and D, if the arrangement shown on page 236 is used.

The foregoing lists of materials do not include any extra parts. A number of extra Tantalum Lamps should be ordered, and it would be well to order one extra Accumulator for every ten Equipments so as to have one on hand in case of an emergency.

In addition to the material given in the lists a 16 c. p. Edison Base Lamp is required for each Signal Lantern.

A Specification Blank giving full directions for ordering will be mailed on request.

For complete description of Signal System see pages 235 to 240.

Imperial Luminous Arc Headlights

Types LA, LB, LC and LD

General Description

THE Imperial Luminous Arc Headlights are made in four types, as listed on the following pages, and the luminous arc feature embodies the latest developments in electric headlights and is a very radical departure from the ordinary practice in that special copper and composition electrodes are used in the place of regular carbon electrodes. These new style electrodes have an exceedingly long life of actual burning, and result in a very low cost of maintenance.

Another source of annoyance and expense is eliminated, as due to the nature of the luminous electrodes no inner globes are required. An adjustment of the lower electrode once a day and the upper electrode once in about sixty days is sufficient to keep the arc in focus as the consumption of the electrodes is very slow.

The mechanism of the Luminous is very simple, and consists of comparatively few parts. The case is made of galvanized sheet iron reinforced in such a manner as to insure great strength. The door consists of a cast iron rim in which the glass is attached by means of a suitable glass holder. A ventilator is mounted on top of the headlight case in such a manner as to carry off the fumes of combustion from the electrodes.

The Types LA and LB Headlights are fitted with a semaphore lens, thus eliminating the necessity of a reflector. The semaphore lens projects a narrow beam of light to a greater distance than it is possible to do with headlights using reflectors and plain glass lens. The light is very steady, and there are no dark spots or shadows in the beam of light projected. The semaphore lens is strongly recommended for high speed interurban roads.

A polished aluminum reflector and plain glass is used in the Types LC and LD Headlights. This arrangement makes a broader beam of light than the semaphore lens, but does not project the light to as great a distance, and for this reason the Types LC and LD Headlights are recommended for low speed interurban service.

See listing on pages 243 and 244.

Imperial Luminous Arc Headlights

Types LA and LB



Type LA Headlight. No. 10530

THE Type LA is a Combination Luminous Arc and Incandescent Headlight, while the Type LB is arranged for Luminous Arc only. Both types have a 12-inch semaphore lens and no reflector is necessary.

Complete wiring equipment for the Type LA Headlight for single and double end cars is the same as that shown on page 245 for the Type A Imperial Arc Headlight. Complete wiring equipment for the Type LB Headlight for single and double end cars is the same as that shown on page 246 for the Type B Imperial Arc Headlight.

Type LA, Combination Arc and Incandescent

Code Word	No.	List Each
<i>Farrow.</i>	10530—Type LA Headlight, without Wiring Equipment (as shown in cut).....	\$35 00
<i>Farthing.</i>	10531—Type LA Headlight, with complete Wiring Equipment for Single End Car.....	42 70
<i>Fascine.</i>	10532—Type LA Headlight, with complete Wiring Equipment for Double End Car.....	44 70

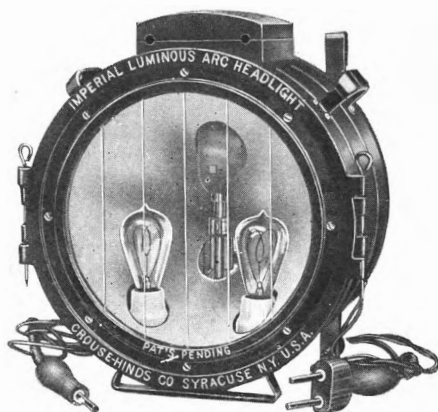
Type LB, Arc Only

<i>Fashion.</i>	10533—Type LB Headlight, without Wiring Equipment.....	\$28 00
<i>Fatalist.</i>	10534—“ “ with complete Wiring Equipment for Single End Car.....	36 70
<i>Fateful.</i>	10535—Type LB Headlight, with complete Wiring Equipment for Double End Car.....	37 70

See complete description of Luminous Headlights on page 242.

Imperial Luminous Arc Headlights

Types LC and LD



Type LC Headlight. No. 10536

THE Type LC is a Combination Luminous Arc and Incandescent Headlight, while the Type LD is arranged for Luminous Arc only. Both types have a 12-inch polished aluminum reflector with plain glass lens.

The complete wiring equipment for the Type LC Headlight for single and double end cars is the same as that shown on page 245 for use with the Type A Imperial Arc Headlight. The complete wiring equipment for the Type LD Headlight for single and double end cars is the same as that shown on page 246 for the Type D Imperial Arc Headlight.

Type LC, Combination Arc and Incandescent

Code Word	No.	List Each
<i>Fathom.</i>	10536—Type LC Headlight, without Wiring Equipment (as shown in cut).....	\$32 00
<i>Fatigate.</i>	10537—Type LC Headlight, with complete Wiring Equipment for Single End Car.....	39 70
<i>Faulter.</i>	0538—Type LC Headlight, with complete Wiring Equipment for Double End Car.....	41 70

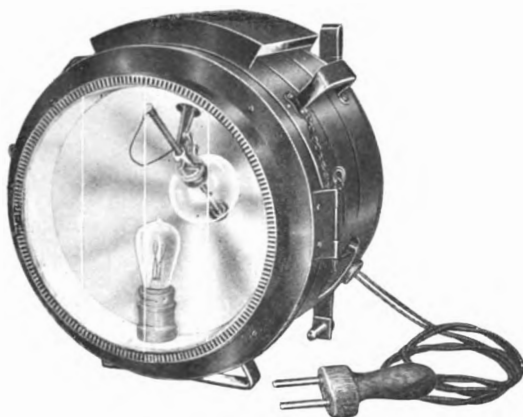
Type LD, Arc Only

<i>Faulting.</i>	10539—Type LD Headlight, without Wiring Equipment.....	\$25 00
<i>Favorer.</i>	10540—“ “ with complete Wiring Equipment for Single End Car.....	33 70
<i>Feaster.</i>	10541—Type LD Headlight, with complete Wiring Equipment for Double End Car.....	34 70

See complete description of Luminous Headlights on page 242.

Type A Imperial Arc Headlight

Combination Arc and Incandescent



Type A Headlight No. 9313

THIS Headlight can be changed from arc to incandescent or vice versa, by simply turning a switch located within reach of the motorman.

Each Headlight is furnished with a 12-inch highly polished parabolic aluminum reflector.

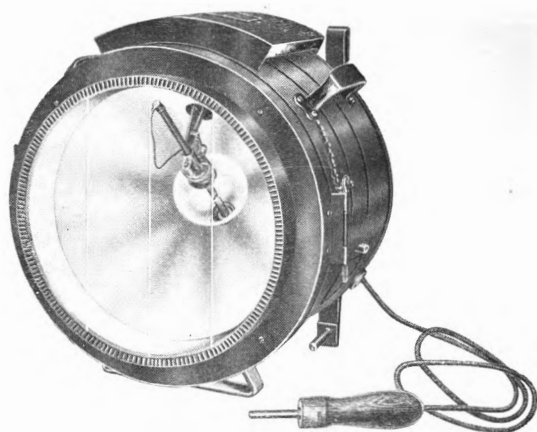
A complete wiring equipment for double end car, as listed below, includes: One main resistance, two dash hangers, two plug receptacles, one fuse and fuse block and two multiple break switches. The complete wiring equipment for a single end car is same as above, with the exception that only one dash hanger, plug receptacle and snap switch are required.

When ordering headlights to be used on cars wired for other makes of arc headlights, state type of plug receptacle and distance from center to center of dash hanger, also type of headlight.

Code Word	No.	List Each
<i>Federate.</i>	9313—Headlight, without Wiring Equipment (as shown in cut).....	\$31 97
<i>Feigned.</i>	9312— “ with complete Wiring Equipment for Single End Car.....	39 76
<i>Felicitify.</i>	9311—Headlight, with complete Wiring Equipment for Double End Car.....	41 70

See list of Parts and Accessories on page 249.

Type B Imperial Arc Headlight



Type B Headlight. No. 9316

THE Type B Imperial Arc Headlight is exactly similar to the Type A illustrated on the preceding page, except that it does not have the incandescent lamp attachment.

This Headlight is furnished with a 12-inch highly polished parabolic aluminum reflector.

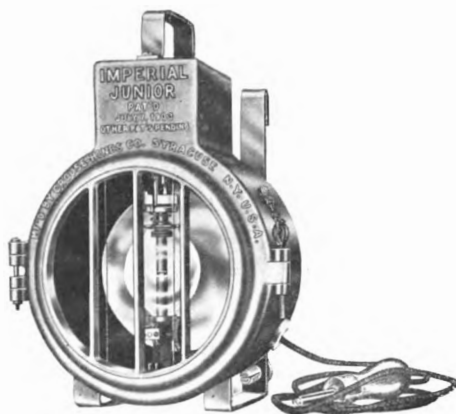
A complete wiring equipment for double end car, as listed below, includes: One main resistance, two dash hangers, two plug receptacles, one fuse and fuse block and two multiple break switches. The complete wiring equipment for a single end car is same as above with the exception that only one dash hanger, plug receptacle and snap switch are required.

When ordering headlights to be used on cars wired for other makes of arc headlights, state type of plug receptacle and distance from center to center of dash hanger, also type of headlight.

Code Word	No.	List Each
<i>Felsite.</i>	9316—Headlight, without Wiring Equipment (as shown in cut).....	\$25 02
<i>Fenerate.</i>	9315—“ with complete Wiring Equipment for Single End Car.....	33 81
<i>Ferret.</i>	9314—Headlight, with complete Wiring Equipment for Double End Car.....	34 75
<i>Foamless.</i>	10476—Dimmer, for use with Type B Headlight.....	2 30

See list of Parts and Accessories on page 249.

Junior Imperial Arc Headlight



Junior Headlight. No. 10542

THE Junior Arc Headlight is intended for use on city trolley systems which extend into suburbs and pass through poorly lighted streets, as this service demands more illumination than Incandescent Headlights can produce.

The Junior Headlight will project sufficient light to illuminate the track a considerable distance ahead of the car without being too glaring, and the case is too small to interfere with the fender and it will withstand extremely rough usage.

Each Headlight is furnished with a 6-inch highly polished parabolic aluminum reflector.

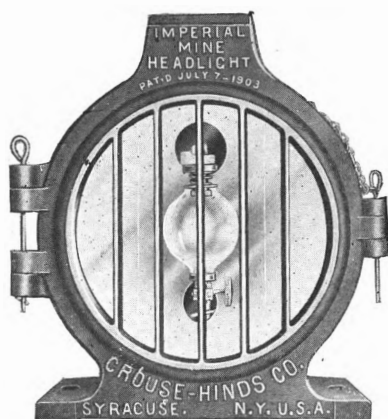
The wiring equipments for single and double end cars are the same as those mentioned on page 246 for the Type B Headlight.

Code Word	No.	List Each
<i>Fervency.</i>	10542—Headlight, without Wiring Equipment (as shown in cut).	\$13 50
<i>Error.</i>	10543— " with complete Wiring Equipment for Single End Car.	20 00
<i>Festival.</i>	10544—Headlight, with complete Wiring Equipment for Double End Car.	21 00

See list of Parts and Accessories on page 249.

Type M Imperial Arc Headlight

For Mine Locomotives



Type M Headlight. No. 10545

THE Type M Mine Headlight is made in two styles, one for rigid attachment and the other with a turret base which permits the Headlight to be turned a complete revolution and locked in position.

The turret base feature makes it possible to use one Headlight to each locomotive, but this arrangement can only be used where there is sufficient head room to allow it to be mounted on top of the locomotive.

In low vein mines two Headlights are usually required for each locomotive.

The Headlight has a heavy cast iron case finished with a special weatherproof black enamel fitted with a 9-inch parabolic aluminum reflector.

A complete wiring equipment, as listed below, includes: One main resistance fuse, $3\frac{1}{2}$ Amp., 500 V.; one 6 Amp., 600 V. fuse; one fuse block and one multiple break switch.

Code Word	No.	List Each
<i>Festoon.</i>	10545—Headlight, Rigid Base, without Wiring Equipment (as shown in cut).....	\$25 00
<i>Fetcher.</i>	10546—Headlight, Rigid Base, with complete Wiring Equipment for Single End Operation.....	32 00
<i>Fettered.</i>	10547—Headlights (2), Rigid Base, with complete Wiring Equipment for Double End Operation.....	56 00
<i>Fetuous.</i>	10548—Headlight, Turret Base, without Wiring Equipment.....	35 00
<i>Feudal.</i>	10549— “ “ “ with complete Wiring Equipment.....	42 00

See list of Parts and Accessories on page 249.

Imperial Arc Headlight Parts

Repair Parts for the Imperial Arc Headlights listed on the preceding pages can be furnished promptly. Prices on application.

Multiple Break Headlight Switch



No. 10412

TEN air gaps reduce arcing to a minimum and greatly increase life of Switch. All current-carrying parts are thoroughly insulated from handle and cover, as the blades are moulded into composition cross-bars.

Code Word	No.	List Each
<i>Feudary.</i>	10413—Switch, Single Throw for use with Straight Arc Headlights.	\$1 50
<i>Feudist.</i>	10412— “ Double “ “ “ “ Combination Arc Headlights	1 70

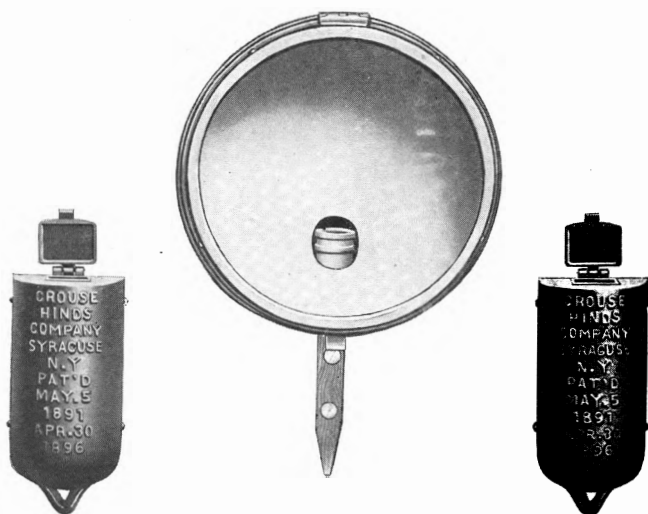
Carbons and Inner Globes

For Imperial Arc Headlights

Code Word	No.	List
<i>Fibroid.</i>	10000—Upper Carbons for all Headlights in which Carbons are set at an angle. Size $\frac{1}{8}$ x 8 inches, per 100.	\$5 48
<i>Fiddler.</i>	10001—Upper Carbons for all Headlights in which Carbons are set vertically. Size $\frac{3}{8}$ x 6 inches, per 100.	4 38
<i>Fidget.</i>	10002—Lower Carbons for all Headlights <i>except</i> those used in alternating current. Size $\frac{3}{8}$ x $4\frac{1}{2}$ inches, per 100.	3 38
<i>Fielded.</i>	10003—Lower Carbons for all Headlights used in alternating current. Size $\frac{1}{2}$ x $4\frac{1}{2}$ inches, per 100.	4 88
<i>Figurist.</i>	10004—Inner Globes of clear glass for use with all Headlights with angular Carbons, per dozen.	3 88
<i>Filacer.</i>	10006—Inner Globes of clear glass for use with all Headlights with vertical Carbons, per dozen.	3 38

Syracuse Changeable Headlight

Incandescent



Equipment for Double End Car

THE Syracuse Headlight can be changed from one end of a car to the other and can be used on closed cars while the open cars are out of service, and vice versa.

The Reflector is intended for use with a 16 c. p. lamp and is 12 inches in diameter, parabolic in shape, spun from a sheet of polished aluminum and is protected by a heavy wrought steel jacket. It projects $7\frac{1}{2}$ inches from dash of car and therefore does not interfere with the fender. The Receptacle is made of cast iron and is weatherproof.

A complete equipment for a double end car includes one Reflector and two Receptacles, while that for a single end car includes one Reflector and one Receptacle.

The Reflector is regularly furnished with an Edison base lamp socket.

Code Word	No.	List Each
<i>Filbert.</i>	9323—Headlight Equipment, complete for Double End Car.....	\$11 20
<i>Filial.</i>	9324— " " " " Single " "	8 95
<i>Filtrate.</i>	9325—Reflector only, complete with Jacket and Stem.....	6 70
<i>Finable.</i>	9326—Receptacle only, complete with Mechanism.....	2 25

Type W Headlights

Incandescent



Plain Door



Grid Door



Semaphore Lens

THE Type W Headlights are intended to be attached to the outside of the dash and are made with plain rim door, grid frame door and with semaphore lens, all with 9-inch parabolic reflectors.

The plain glass is double thick.

All three styles are $14\frac{1}{4}$ inches high and $11\frac{1}{4}$ inches in outside diameter.

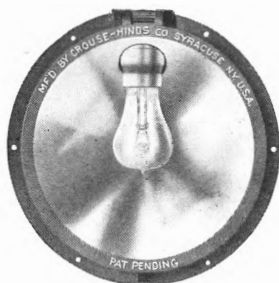
The plain rim and grid frame door styles are $4\frac{1}{2}$ inches deep, while the semaphore lens style is $5\frac{1}{2}$ inches in depth.

The prices below do not include an incandescent lamp.

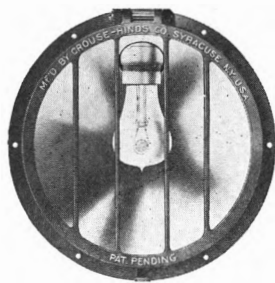
Code Word	No.	List Each
<i>Finative.</i>	10550—Headlight, Plain Door, Aluminum Reflector.....	\$5 20
<i>Finery.</i>	10551— " " " White Enameled Reflector.....	5 20
<i>Finite.</i>	10552— " Grid " Aluminum Reflector.....	5 55
<i>Finlet.</i>	10553— " " " White Enameled Reflector.....	5 55
<i>Firmity.</i>	10554— " Semaphore Lens, Aluminum Reflector.....	6 90
<i>Fishery.</i>	10555— " " " White Enameled Reflector	6 90

Type Z Headlights

Incandescent



Plain Door



Grid Door



Semaphore Lens

TYPE Z Headlights are intended to be mounted flush with the dash and are made with plain rim door, grid frame door and with semaphore lens, all with $10\frac{3}{4}$ -inch parabolic reflectors.

All three styles are $12\frac{3}{8}$ inches high and $12\frac{3}{8}$ inches in outside diameter.

The plain rim door style is $4\frac{5}{8}$ inches deep, the grid frame door style is $4\frac{1}{8}$ inches deep, and the semaphore lens style is $5\frac{1}{8}$ inches deep.

Prices below do not include an incandescent lamp.

When mounted on a wooden dash the Reinforcing Ring should be used as a means of supporting the ends of the boards, as these can be tightly clamped against the flange on the cast iron case of the Headlight by means of this ring.

Code Word	No.	List Each
<i>Fistic.</i>	10556—Headlight, Plain Door, Aluminum Reflector.....	\$5 20
<i>Fixation.</i>	10557— " " " White Enameled Reflector.....	5 20
<i>Flacket.</i>	10558— " Grid " Aluminum Reflector.....	5 55
<i>Flagship.</i>	10559— " " " White Enameled Reflector.....	5 55
<i>Flanker.</i>	10560— " Semaphore Lens, Aluminum Reflector.....	6 90
<i>Flapper.</i>	10561— " " " White Enameled Reflector....	6 90
<i>Flative.</i>	10562—Reinforcing Ring for use with Wood Dash.....	65

Tomlinson Automatic Radial Car Coupler

Patented

General Description

THE Tomlinson Coupler illustrated on the following pages is the only radial type of Car Coupler on the market which is absolutely automatic in action, not only when coupling, but also from the fact that as soon as it is uncoupled the interlocking hooks immediately resume their normal position automatically, ready for instant coupling, so that it never becomes necessary to enter between the cars when coupling. There are no parts to be adjusted before a coupling can be made, no knuckles to open, and no loose links, pins or other parts which would be liable to be lost or mislaid.

This Coupler operates with such ease that it is not necessary to set brakes on the car to be coupled, as a very slight contact between the hooks is all that is necessary to make an instantaneous coupling. This feature is very valuable in emergencies, such as fires in car barns, as one man with a motor car could back into a string of any number of cars in a barn and instantly couple all of them and draw them out to a place of safety.

The Tomlinson Coupler uncouples with the greatest ease, as it is only necessary for the trainman to give a light pull on the short chain attached to the unlocking lever on the head of the Coupler. This lever releases the interlocking hooks and the cars can then be moved apart.

The Tomlinson Coupler will intercouple with the various standard radial Couplers now in use without removing or deranging any of the parts of the Coupler. The Couplers will readily adapt themselves to abrupt changes in grade when used with the Spring Drawbar Carrier listed on page 263.

The body casting is made of malleable iron, and the coupling hook of high carbon steel. Reference to the illustrations on the following pages will show the shape of this hook and also the serrated coupling face of the body casting. This arrangement makes an absolutely rigid coupling, and therefore does away with all surging between cars and greatly facilitates the control of the train.

We guarantee that Tomlinson Couplers will not become uncoupled on curves with either pulling or pushing strains.

A specification blank giving full data for ordering will be furnished on request.

See lists and descriptions of Couplers, Draft Gears, etc., on the following pages.

Tomlinson Automatic Radial Car Coupler

Patented

Forms 5 and 6—Size No. 1



No. 10335, Form 5 Coupler



No. 10478, Form 6 Coupler

THE Forms 5 and 6, No. 1 Couplers are for use where loads are not excessive and are recommended for city work where trailers are hauled, having ample strength to take care of the most severe curves and grades to be met in this service. The coupler head presents a wide flat surface which, in emergency, permits intercoupling with practically all standard Couplers now in use on city cars, making it possible to equip new cars with the Tomlinson Couplers without it being necessary to discard the existing Coupler equipment (see page 256). The Coupler head and draft gear are in one piece, the body terminating in a sleeve which receives the tail piece.

The Form 5 Coupler is intended for use where the anchorage has a vertical pin. The tail pin hole will permit the use of a pin not larger than 1½ inches. Over-all length from center of tail pin to face of Coupler is 4 feet 6 inches.

The Form 6 Coupler is used with the Form 1 Anchorage listed on page 264, and differs from the Form 5 in having a vertical eye in the tail piece. Over-all length of Coupler from face of hook to center of tail pin is 4 feet, and the anchorage takes up 6 inches. This gives the Coupler an effective over-all length of 4 feet 6 inches.

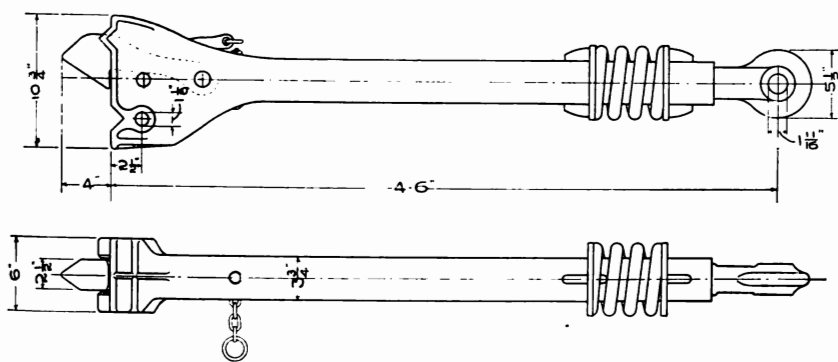
Code Word	No.	List Each
<i>Glider.</i>	10335—Form 5, Size No. 1 Coupler.....	\$41 25
<i>Glimmer.</i>	10478 — “ 6, “ 1 “	41 25

See general description of Tomlinson Couplers on page 253.

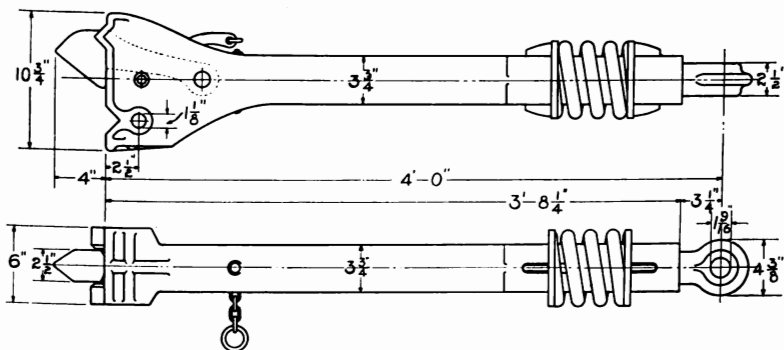
Tomlinson Automatic Radial Car Coupler

Forms 5 and 6—Size No. 1

Continued



No. 10335. Form 5 Coupler, Showing Dimensions



No. 10478. Form 6 Coupler, Showing Dimensions

See description and list on page 254.

Tomlinson Automatic Radial Car Coupler

Forms 5 and 6—Size No. 1

Continued

Inter-Coupling Feature

No adjustment or change necessary in Tomlinson Coupler.

Note the "face to face" contact of coupler heads

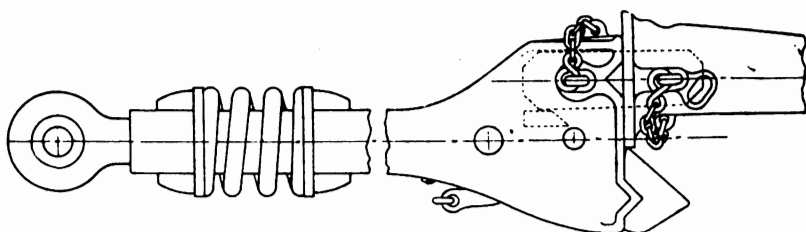


Fig. 1. Tomlinson, Form 5, Size No. 1 Coupled to Van Dorn Coupler

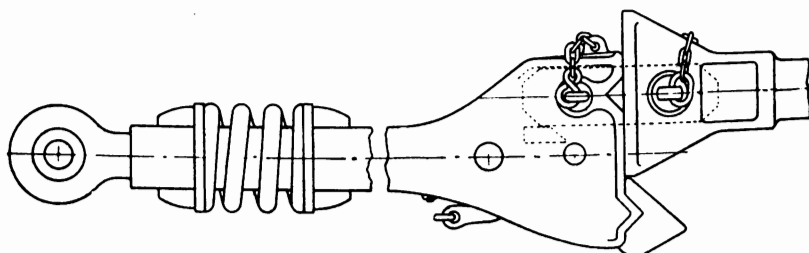


Fig. 2. Tomlinson, Form 5, Size No. 1 Coupled to Brill Coupler

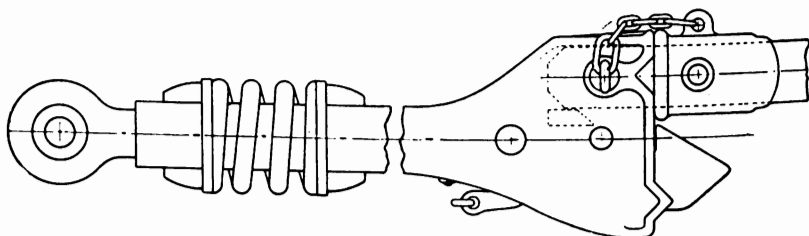


Fig. 3. Tomlinson, Form 5, Size No. 1 Coupled to Standard "Pocket" Coupler

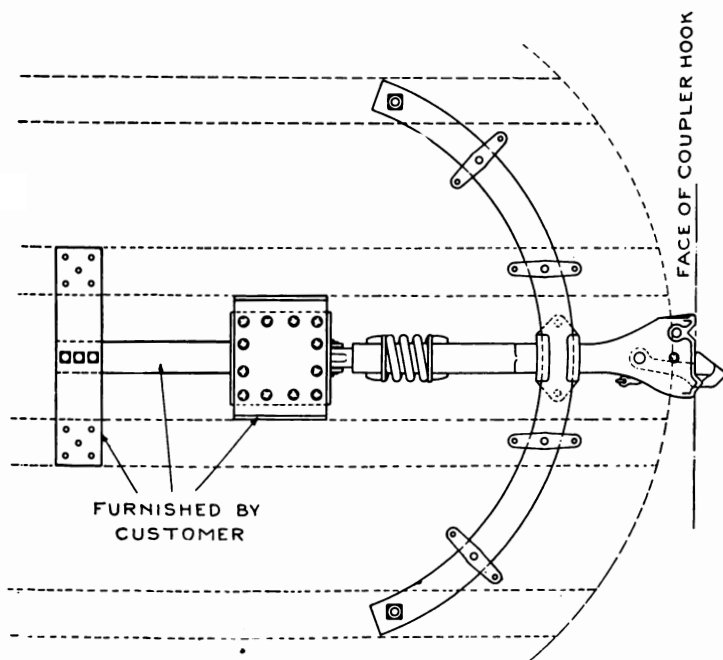
NOTE:—The Form 6 Coupler possesses the same intercoupling feature as the Form 5 illustrated above.

See description and list on page 254.

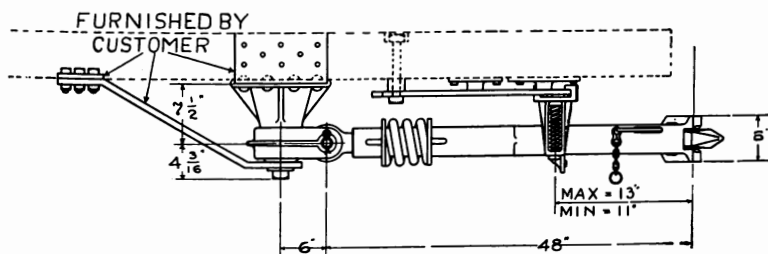
Tomlinson Automatic Radial Car Coupler

Forms 5 and 6—Size No. 1

Continued



Top View of Form 6 Coupler Mounted on Car



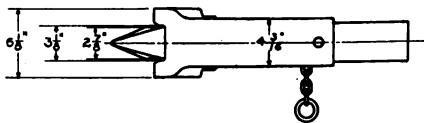
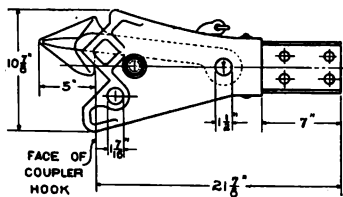
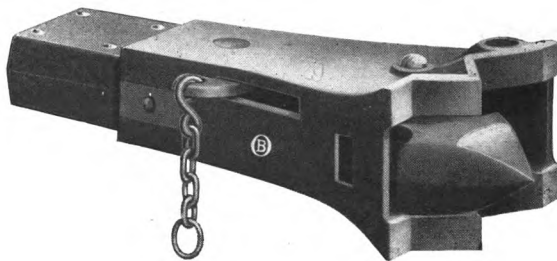
Side View of Form 6 Coupler Mounted on Car

See description and list on page 254.

Tomlinson Automatic Radial Car Coupler

Patented

Form 2—Size No. 2



THE Form 2, size No. 2 Coupler is considerably heavier than the Forms 5 and 6, size No. 1 Couplers, and is designed for heavy city, suburban and light interurban service. This form of coupler is designed for use with the Channel Bar Draft Gears listed on page 260.

Code Word
Glimpse.

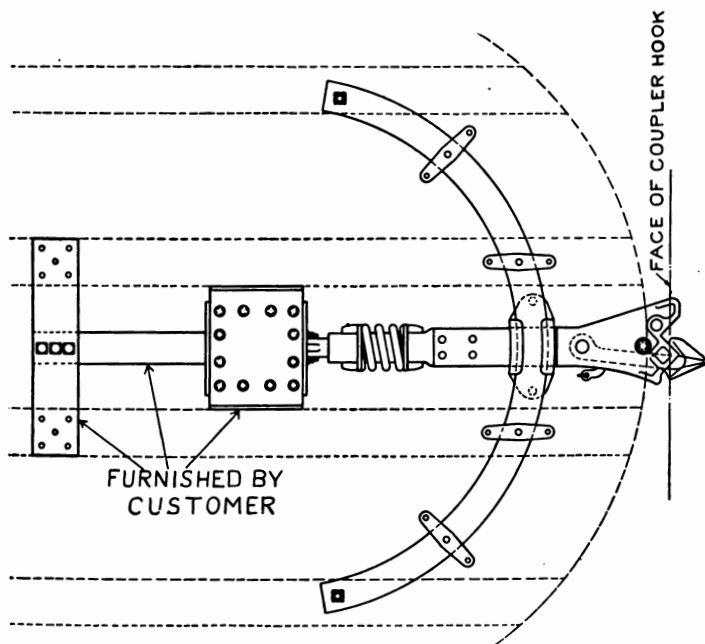
No.	List Each
9463—Form 2, Size No. 2 Coupler.....	\$40 00

See general description of Tomlinson Couplers on page 253.

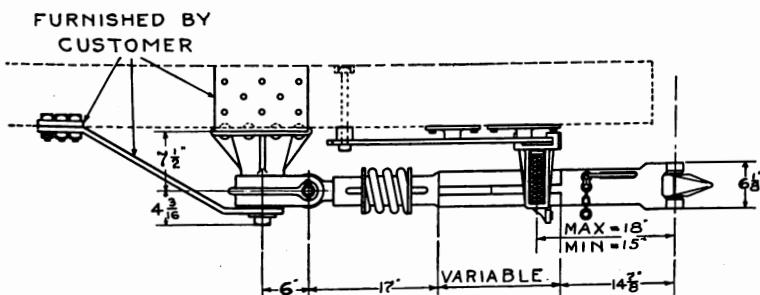
Tomlinson Automatic Radial Car Coupler

Form 2—Size No. 2

Continued



Top View of Form 2 Coupler Complete, with Form 3 Draft Gear Mounted on Car

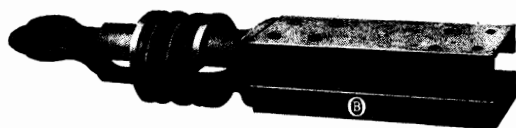


Side View of Form 2 Coupler Complete, with Form 3 Draft Gear Mounted on Car

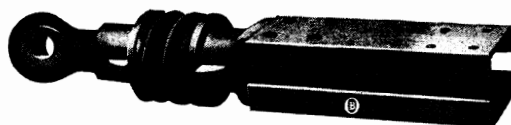
See description and list on page 258.

Channel Bar Draft Gears

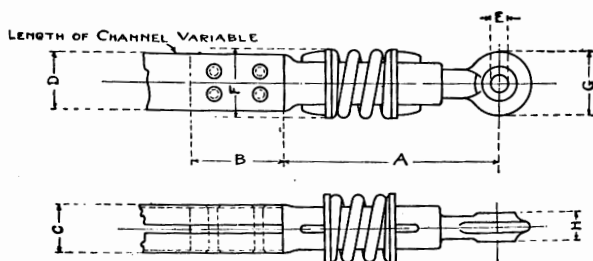
Forms 2 and 3—Size No. 2



No. 9470. Form 2 Draft Gear



No. 10479. Form 3 Draft Gear



Dimension Cut of No. 9470—Form 2 Draft Gear

THE Forms 2 and 3, size No. 2 Channel Bar Draft Gears are intended for use with the Form 2, size No. 2 Coupler listed on page 258. The Form 3 Draft Gear is equipped with a vertical eye and is intended for use with the Form 1 Anchorage listed on page 265. The over-all length of the assembled Coupler from center of eye to face of hook, with the Form 3 Draft Gear, should be 6 inches less than when the Form 2 Draft Gear with horizontal eye is used, as the Form 1 Anchorage adds 6 inches to the effective over-all length of the Coupler.

The minimum length of Coupler, Catalogue No. 9463, from face of hook to center of tail pin hole when combined with Draft Gear, Catalogue No. 10479, is 46 inches, and when combined with Draft Gear, Catalogue No. 9470, is 48 inches.

Code Word	Cat. No.	Form and Size Nos.	Dimensions in Inches								Weight in Lbs.	List Each
			A	B	C	D	E	F	G	H		
<i>Glisten</i>	9470	2-2	19	7	4½	5	1½	6	5½	2½	*80	\$22 50
	10479	3-2	17	7	4½	5	1½	6	4½	2½	*78	22 50

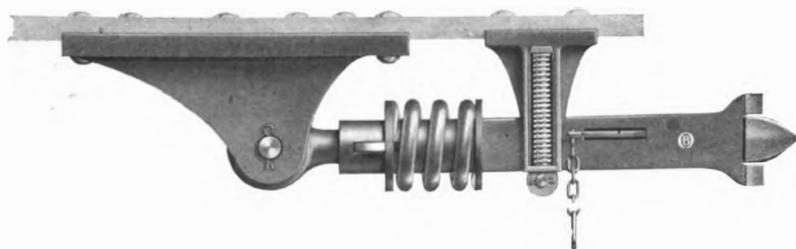
† The dimension cut shows the Form 2 Draft Gear. The Form 3 has the Eye in the vertical plane instead of the horizontal plane shown in cut.

*Weights do not include Channel Bars.

Tomlinson Automatic Radial Car Coupler

Patented

Form 4, Size No. 2—For Drop Draft Gear



No. 9466. Form 4, No. 2 Coupler

THE Type A, Form 4, Coupler illustrated above is for use where the motors and trucks interfere with the standard type of draft rigging, being designed for city and light interurban service.

The Coupler as listed is furnished complete as shown above, with the exception of the flat steel upper plate, as this bar is usually furnished by the car builder.

A specification blank giving full data for ordering will be furnished on request.

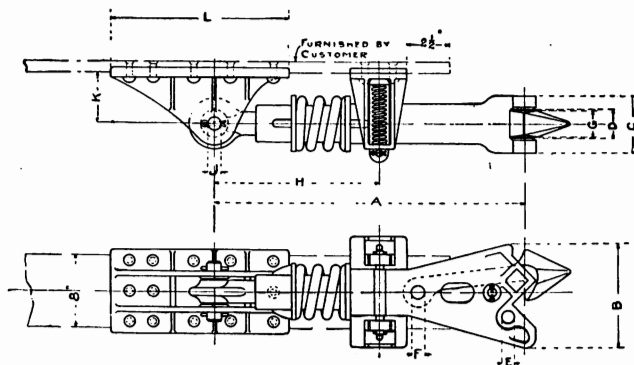
Code Word	No.	List Each
<i>Gloaming.</i>	9466—Form 4, Size No. 2 Coupler.....	\$127 00

See page 253 for general description and page 262 for dimensions and other data.

Tomlinson Automatic Radial Car Coupler

Form 4—Size No. 2

Continued



Cat. No.	Form and Size Nos.	Dimensions in Inches					
		A	B	C	D	E	F
9466	4-2	34	10 $\frac{7}{8}$	6 $\frac{1}{8}$	3 $\frac{1}{8}$	1 $\frac{7}{8}$	1 $\frac{1}{2}$

Cat. No.	Form and Size Nos.	Dimensions in Inches					Weight Complete in Lbs.
		G	H	J	K	L	
9466	4-2	2 $\frac{7}{8}$	18	1 $\frac{1}{2}$	6	19 $\frac{1}{4}$	*280

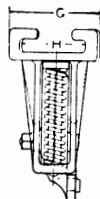
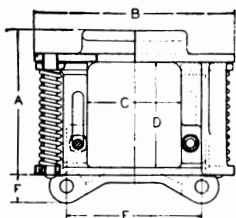
* This weight is exclusive of the flat bar furnished by customer.

See page 261 for list and description of the above Coupler.

Spring Draw Bar Carrier

Form 1—Sizes Nos. 1 and 2

Patented



THE Spring Draw Bar Carrier serves to hold the coupler parallel to the car sills under normal conditions, but offers a yielding support so that the couplers can take abrupt breaks of grade without straining the Carrier. The action of the Carrier is clearly shown in the illustrations on page 264. The Carrier slides on the steel bar listed on page 266.

The coupler support yoke has a vertical adjustment which greatly facilitates adjusting the Carrier height on the individual cars and this yoke is provided with two eyes which can be used for carrying the air-hose connections.

Dimensions in Inches

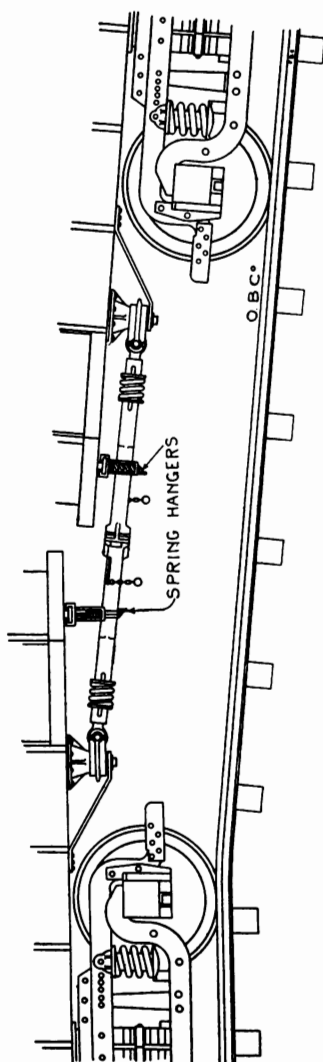
Code Word	No.	Size No.	A	B	C	D		E	F	G	H	List Each
						Max.	Min.					
<i>Flaunt</i>	10339	1	9	11	4½	6¾	8¼	7	1½	5½	4¾	\$12 50
<i>Flavor</i>	10477	2	9¾	13½	6¼	7	10	9	1½	6	4¾	16 25

Dimensions "D" in the above table are taken with Springs not compressed, and do not include the additional clearance obtained when the Springs are compressed by loading.
See page 264 for diagrams showing operation of Spring Carrier.

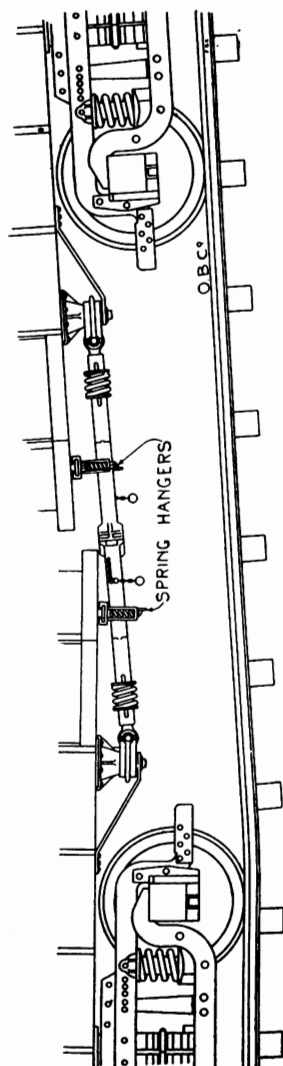
Spring Draw Bar Carrier

Form 1—Patented

Continued



Showing Action of Spring Hangers on a Downward Break in Grade

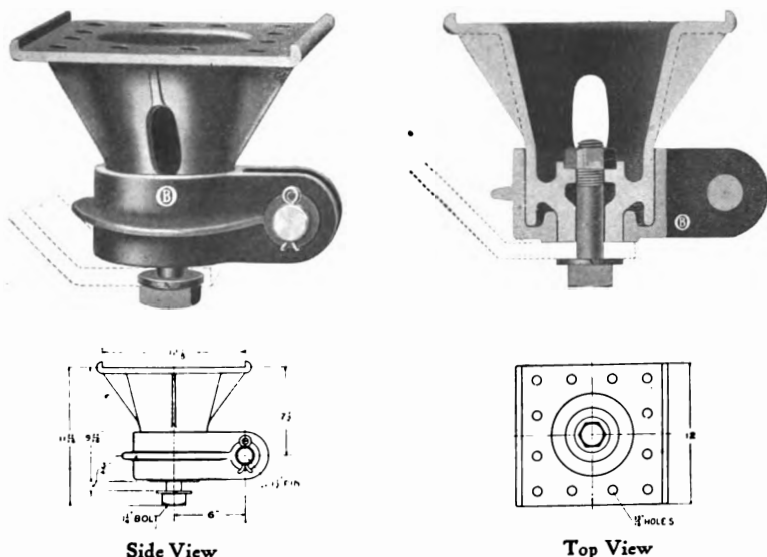


Showing Action of Spring Hangers on an Upward Break in Grade

See description and list on page 263.

Draw Bar Anchorage

Form 1—Size No. 1



THIS Anchorage permits unrestricted horizontal and vertical motion of the coupler head, and is designed so that it requires very little labor to install it on the car.

It is arranged to be riveted to a steel plate 1 inch thick and 12 inches wide, this plate being secured to the car. A back brace made of $\frac{3}{4}$ -inch by 4-inch steel bar is run from the bottom of the Anchorage to the car sills, as shown in the cuts on page 264.

Because of the great differences in car design, the main attachment plate and the back brace are not included with the Anchorage.

The distance from the pivotal center of the Anchorage to the center of clevis pin which carries the coupler tail piece is 6 inches, hence the effective radial length of any coupler used with this Anchorage is increased 6 inches. This fact should be borne in mind in determining upon the proper length of coupler. Note that the couplers used with this type of Anchorage must have a vertical eye in the tail piece the same as Form 3, No. 2, or Form 6, No. 1, Tomlinson Couplers.

Twelve $\frac{3}{4}$ -inch rivets are supplied with each Anchorage.

Code Word
Flawter.

No.
10475—Form 1, Size No. 1, Anchorage.....

List Each
\$12 50

Carrier Slide Bar



THIS Bar is used as a support for the Spring Draw Bar Carrier listed on page 263. The Bar is attached to the car sills by means of counter-sunk bolts with proper spaced washers, or preferably with the Slide Bar Supports listed below. The Slide Bars are shipped not drilled, as the holes must be located to come opposite the car sills. The Slide Bar is $\frac{5}{8}$ inches by 4 inches and is formed on a radius of 34 inches. The arc formed by the Slide Bar is 160 degrees.

Code Word
Fleaking.

No. 10033—Radial Slide Bar for Spring Carrier Nos. 10030—31.....

List Each

\$12 50

Slide Bar Support



THE Slide Bar Supports are used for attaching the Carrier Slide Bar to the car sills and allow sufficient clearance to permit the Spring Draw Bar Carrier to move around the Slide Bar.

They are shipped in sets of four, this being the number usually required. Four $\frac{3}{4}$ -inch rivets are included with each set of these supports.

Code Word
Flecker.

No. 10495—Slide Bar Supports, set of four.....

List per Set

\$2 50

Tables

Comparison of Aluminum and Copper Conductors

THE specific gravity of Aluminum is 2.68 and of Copper 8.93; or in other words, Copper is 3.33 times heavier than Aluminum, volume for volume. The conductivity of Copper varies from 96 to 99 while for Aluminum it varies from 59 to 63. Taking the conductivity of Copper as 97 and of Aluminum as 61, the size of a cable made of Aluminum in order to have the same carrying capacity as that of a Copper cable, would be 1.59 times the area in circular mils of the Copper cable. Thus, a Copper cable of 300000 C. M. area, if replaced by a cable of Aluminum, the Aluminum cable would have an area of 1.59 times 300000 C. M., or 477000 C. M. The comparative weights, therefore, of equal lengths and equal conductivities of Copper and Aluminum cables are as 1 to .48; that is, a cable of Aluminum would weigh 48% of that of a Copper cable of the same length and conductivity.

Comparative Weights of Stranded Copper and Aluminum Cables

No. B. & S. Gauge	Circular Mils.	Diameter		Weights			
		Inches	Nearest 32nd of an Inch	Pounds per 1000 Feet		Pounds per Mile	
				Copper	Aluminum	Copper	Aluminum
	1,000,000	1.152	1 $\frac{5}{16}$	3050	920	16104	4860
	950,000	1.125	1 $\frac{1}{8}$	2898	874	15299	4617
	900,000	1.092	1 $\frac{3}{16}$	2745	828	14494	4374
	850,000	1.062	1 $\frac{1}{4}$	2593	782	13688	4131
	800,000	1.035	1 $\frac{1}{8}$	2440	736	12883	3888
	750,000	.999	1	2288	690	12078	3645
	700,000	.963	$\frac{31}{32}$	2135	644	11273	3402
	650,000	.927	$\frac{15}{16}$	1983	598	10468	3159
	600,000	.891	$\frac{7}{8}$	1830	552	9662	2916
	550,000	.855	$\frac{5}{8}$	1678	506	8857	2673
	500,000	.819	$\frac{13}{16}$	1525	460	8052	2430
	450,000	.770	$\frac{25}{32}$	1373	414	7247	2187
	400,000	.728	$\frac{23}{32}$	1220	368	6442	1924
	350,000	.679	$\frac{11}{16}$	1068	322	5636	1701
	300,000	.630	$\frac{5}{8}$	915	276	4831	1458
	250,000	.590	$\frac{19}{32}$	762	230	4026	1215
0000	211,600	.530	$\frac{17}{32}$	645	195	3405	1028
000	168,100	.470	$\frac{15}{32}$	513	155	2709	816
00	133,225	.420	$\frac{7}{16}$	406	123	2144	647
0	105,625	.375	$\frac{3}{8}$	322	97	1700	513

Tables

Comparative Weights of Solid Copper and Aluminum Wires

American Gauge, B. & S. No.	Diameter Mils	Area		Weights			
		Circular Mils	Square Inches	Pounds per 1000 Feet		Pounds per Mile	
				Copper	Aluminum	Copper	Aluminum
0000	460	211,600	.166190	641	193	3382	1018
000	410	168,100	.131793	509	153	2687	808
00	365	133,225	.104520	403	121	2129	640
0	325	105,625	.082932	320	96	1688	507
1	289	83,521	.065733	253	76	1335	403
2	258	66,564	.052130	202	60	1064	319
3	229	52,441	.041338	159	48	838	253
4	204	41,616	.032784	126	38	665	201
5	182	33,124	.025998	100	30	529	159
6	162	26,244	.020617	79	24	419	126
7	144	20,736	.016349	63	19	331	100
8	128	16,384	.012966	50	15	262	79
9	114	12,996	.010284	39	12	208	63
10	102	10,404	.008153	32	9	166	49
11	91	8,281	.006467	25	8	132	40
12	81	6,561	.005128	20	6	105	31
13	72	5,184	.004067	15.7	4.720	83	25
14	64	4,096	.003225	12.4	3.743	65	20
15	57	3,249	.002557	9.8	2.968	52	16
16	51	2,601	.002028	7.9	2.354	42	12
17	45	2,025	.001608	6.1	1.867	32	10
18	40	1,600	.001275	4.8	1.480	25.6	7.8
19	36	1,296	.001011	3.9	1.174	20.7	6.2
20	32	1,024	.000802	3.0	.9310	16.4	4.9
21	28.5	812.3	.000636	2.5	.7382	13.0	3.9
22	25.3	640.1	.000504	1.9	.5855	10.2	3.1
23	22.6	510.8	.000400	1.5	.4643	8.2	2.5
24	20.1	404.0	.000317	1.2	.3682	6.5	1.9
25	17.9	320.4	.000251	.97	.2920	5.1	1.5

Tables

Properties of Bare and Insulated Stranded Copper Cable

Size B. & S. Gauge	Area		No. of Wires in Strand	Diameter		Weight—Pounds per 1,000 Feet			Resistance Ohms per 1,000 Ft. at 68° Fahr.	
	Circular Mils	Square Inches		Bare	Over Insulation		Bare	Insulated		
					3 Braid	2 Braid		3 Braid		2 Braid
	2,000,000	1.56874	91	2.000	1.875	6204.8	7008	6690	0.00530	
	1,750,000	1.36494	91	1.906	1.781	5429.3	6193	5894	0.00607	
	1,500,000	1.17831	91	1.781	1.656	4653.6	5380	5098	0.00707	
	1,250,000	.98170	91	1.656	1.531	3878.0	4508	4264	0.00852	
	1,000,000	.78494	61	1.531	1.406	3100.3	3674	3456	0.01060	
	950,000	.74618	61	1.468	1.343	2945.3	3503	3292	0.01115	
	900,000	.70724	61	1.406	1.312	2790.3	3332	3127	0.01179	
	850,000	.66832	61	1.375	1.281	2635.3	3162	2963	0.01247	
	800,000	.62810	61	1.343	1.250	2480.2	2992	2799	0.01325	
	750,000	.58922	61	1.312	1.218	2325.2	2822	2635	0.01413	
	700,000	.54954	61	1.280	1.187	2170.2	2650	2471	0.01514	
	650,000	.51020	61	1.250	1.155	2015.2	2443	2282	0.01630	
	600,000	.47146	61	1.234	1.109	1860.2	2235	2093	0.01767	
	550,000	.43181	37	1.156	1.031	1703.0	2064	1925	0.01925	
	500,000	.39237	37	1.109	1.000	1548.2	1894	1765	0.02116	
	450,000	.35234	37	1.062	.937	1393.4	1724	1601	0.02349	
	400,000	.31431	37	1.031	.906	1238.5	1553	1436	0.02648	
	350,000	.27511	19	.968	.843	1083.34	1345	1248	0.03026	
	300,000	.23591	19	.921	.796	926.01	1174	1083	0.03531	
0000	250,000	.19635	19	.875	.750	771.67	985	907	0.04233	
0000	211,600	.16609	19	.812	.687	653.14	800	745	0.04997	
0000	167,772	.13185	7	.734	.671	512.07	653	604	0.06293	
0000	133,079	.10429	7	.687	.625	406.98	522	482	0.07935	
0	105,625	.08303	7	.640	.578	322.39	424	388	0.10007	
1	83,694	.06599	7	.593	.531	255.45	328	303	0.12617	
2	66,358	.05205	7	.531	.468	202.50	270	246	0.15725	
3	52,624	.04132	7	.468	.421	160.60	206	190	0.19827	
4	41,738	.03276	7	.437	.390	127.40	170	155	0.25000	
6	26,244	.02059	7	.406	.359	80.10	115	103	0.39767	

Properties of Bare and Insulated Solid Copper Wire

Size B. & S. Gauge	Area		Diameter				Weight—Pounds per 1000 Feet				Resistance Ohms per 1,000 Ft. at 68° Fahr.
	Circular Mils	Square Inches	Bare		Over Insulation		Bare	Insulated			
			Inches	Millimeters	3 Braid	2 Braid		3 Braid	2 Braid		
0000	211,600	.16619	.4600	11.683	.640	.609	640.5	767	723	.04893	
000	167,772	.13177	.4096	10.404	.593	.562	507.8	629	587	.06170	
00	133,079	.10452	.3648	9.266	.515	.500	402.8	502	467	.07780	
0	105,625	.08295	.3250	8.251	.500	.468	319.7	407	377	.09811	
1	83,694	.06573	.2893	7.348	.453	.422	253.3	316	294	.12370	
2	66,358	.05211	.2576	6.544	.437	.390	200.8	260	239	.15600	
3	52,624	.04133	.2294	5.827	.406	.359	159.3	199	185	.19670	
4	41,738	.03278	.2043	5.190	.359	.328	126.3	164	151	.24800	
6	26,244	.02061	.1620	4.115	.328	.296	80.6	112	100	.39440	
8	16,512	.01297	.1285	3.263	.296	.250	49.9	75	66	.62710	
10	10,384	.00815	.1019	2.588	.234	.203	31.4	53	46	.99720	
12	6,528	.00512	.0808	2.052	.203	.172	19.7	35	30	1.58600	
14	4,108	.00322	.0641	1.628	.187	.156	12.4	25	20	2.52100	
16	2,580	.00202	.0508	1.291	.172	.125	7.8	20	16	4.00900	
18	1,624	.00127	.0403	1.024	.156	.109	4.9	16	12	6.37400	
20	1,024	.00080	.0320	.8118	.156	.109	3.1	12	9	10.14000	

The resistance of copper wire at 68° Fahr. may be found by the formula: $R = \frac{1035 \times}{\text{Circular Mils}}$

The resistance of copper wire at other temperatures may be found by the formula:

$$R_t = R_{68} [1 + .00225 (t^{\circ} - 68^{\circ})]$$

Where t° is the temperature of the wire at which resistance is desired, R_t is the resistance at this temperature and R_{68} the resistance at 68° F. which may be found per 1000 ft. in the above table.

For example, to find the resistance of 1000 ft. of 0000 copper wire at 75° Fahr.:

$$R_{75} = R_{68} [1 + .00225 (75 - 68)] = .04893 \times 1.01575 = .04968 \text{ ohms}$$

Tables

Tensile Strength of Copper Wire

THE tensile strength of soft copper wire varies from 32,000 to 36,000 pounds per square inch, and of hard copper wire from 45,000 to 68,000 pounds per square inch, according to the degree of hardness.

The following table from Roebling is calculated for 34,000 pounds for soft wire and 60,000 pounds for hard wire, except for some of the larger sizes where the breaking weight is taken at 50,000 lbs. for 0000, 000 and 00, 55,000 for 0 and 57,000 for No. 1.

Numbers B. & S. Gauge	Breaking Weight Pounds		Numbers B. & S. Gauge	Breaking Weight Pounds	
	Hard drawn	Annealed		Hard drawn	Annealed
0000	8,310	5,650	9	617	349
000	6,580	4,480	10	489	277
00	5,226	3,553	11	388	219
0	4,558	2,818	12	307	174
1	3,746	2,234	13	244	138
2	3,127	1,772	14	193	109
3	2,480	1,405	15	153	87
4	1,967	1,114	16	133	69
5	1,559	883	17	97	55
6	1,237	700	18	77	43
7	980	555	19	61	34
8	778	440	20	48	27

Tables

Properties of Galvanized Wire Strand

English and Metric Systems

Diameter	Weight	Breaking Strain in Pounds	
Inches	Pounds per 1000 Feet	Ordinary	Special
$\frac{1}{2}$	510	8,320	16,640
$\frac{15}{64}$	480	7,500	15,000
$\frac{7}{16}$	370	6,000	12,000
$\frac{3}{8}$	300	4,700	9,400
$\frac{5}{16}$	210	3,300	6,600
$\frac{9}{32}$	180	2,600	5,200
$\frac{1}{4}$	115	1,750	3,500
$\frac{7}{32}$	87.5	1,300	2,600
$\frac{3}{16}$	65.0	1,000	2,000
$\frac{5}{32}$	45.0	700	1,400
$\frac{1}{8}$	22.5	375	750
$\frac{3}{32}$	20.0	300	640

GALVANIZED Steel Strand used for span construction is composed of 7 wires twisted into a single strand. The breaking strain varies with the grade of steel used, which runs from 55,000 pounds to 300,000 pounds per square inch. The approximate breaking strain of ordinary and special strand is given in table. Sizes most generally used for supporting trolley wires are $\frac{5}{16}$ and $\frac{3}{8}$ inch. For catenary construction, $\frac{1}{4}$ inch strand is used.

Tables

Power Required For Electric Traction

Horse Power and Current Required to Propel One Ton at the following Speeds in Miles per Hour

Per Cent Grade	4	6	8	10	12	15	20	25	30	35	40
H. P. Amps.	H. P. Amps.	H. P. Amps.	H. P. Amps.	H. P. Amps.	H. P. Amps.	H. P. Amps.	H. P. Amps.	H. P. Amps.	H. P. Amps.	H. P. Amps.	H. P. Amps.
0	.21	.35	.53	.71	.89	1.06	1.33	1.60	1.87	2.13	2.35
1	.43	.71	1.07	1.42	1.78	2.13	2.67	3.22	3.77	4.32	4.87
2	.64	1.07	1.60	2.13	2.67	3.22	3.77	4.32	4.87	5.42	5.97
3	.85	1.42	2.13	2.84	3.55	4.26	5.00	5.71	6.42	7.13	7.84
4	1.07	1.78	2.66	3.55	4.43	5.33	6.22	7.12	8.00	8.88	9.77
5	1.28	2.13	3.20	4.27	5.33	6.40	7.48	8.56	9.64	10.72	11.80
6	1.49	2.49	3.73	4.98	6.22	7.48	8.73	9.98	11.23	12.48	13.73
7	1.71	2.85	4.27	5.69	7.12	8.56	9.98	11.40	12.82	14.24	15.66
8	1.92	3.20	4.80	6.40	7.92	9.44	10.96	12.48	13.99	15.51	17.03
9	2.13	3.56	5.33	7.12	8.90	10.68	12.46	14.24	16.02	17.80	19.58
10	2.35	3.91	5.71	7.84	9.64	11.44	13.24	15.04	16.84	18.64	20.44
11	2.56	4.27	6.22	8.33	10.13	11.93	13.73	15.53	17.33	19.13	20.93
12	2.78	4.63	6.66	8.88	10.89	12.71	14.53	16.35	18.17	19.99	21.81
13	2.99	4.98	7.12	9.38	11.33	13.24	15.04	16.84	18.64	20.44	22.24
14	3.20	5.33	7.57	9.87	11.84	13.73	15.53	17.33	19.13	20.93	22.73
15	3.41	5.69	7.92	10.37	12.35	14.24	16.02	17.80	19.58	21.37	23.15

The above table is based on the two formulæ given below. The formula for horse power per car is given by the Westinghouse Electric & Mfg. Co. as follows:

$$\text{Horse Power} = \frac{\text{Miles per hour} \times \text{tractive effort}}{375}$$

The tractive effort is commonly taken at 20 lbs. per ton on a level and 20 lbs. additional for each per cent grade. For trailers add 12 lbs. per ton.

A formula for the current per car deduced from the above assuming 90 per cent efficiency of motors and 500 volt circuit is as follows:

$$\text{Amperes} = \frac{\text{Mi. per hr.} \times 20 \times (\text{wt. of car in tons plus } 225)}{100 \times \text{per cent grade}}$$

As an example of the above, suppose it is desired that a 30 ton car ascend a 2 per cent grade at 25 miles per hr.

From the table under the column headed 25 mi. per hr. opposite 2 per cent grade—H. P. per ton = 4.00 and amperes per ton = 6.66; therefore H. P. per car = 30 x 4.00 = 120 H. P. and Current per car = 30 x 6.66 = 200 Amp.

Tables

Structural Steel Tubing

Styles A and C

STRUCTURAL Steel Tubing is now employed extensively in the construction of pole brackets, two styles being used, which are known as Styles A and C respectively. This Tubing is made of a high grade of steel and is stronger and stiffer than welded pipe, and also has considerably more elasticity. The Style C Tubing is of the same weight and dimensions as standard welded pipe, while the Style A Tubing is considerably lighter in weight.

Nominal Inside Diameter	Actual Outside Diameter		Thickness of Metal				Weight			
	Inches	Millimeters	Inches		Millimeters		Pounds per Foot		Kilograms per Meter	
	A & C	A & C	A	C	A	C	A	C	A	C
1 $\frac{1}{4}$	1.66	42.16	.098	.140	2.49	3.550	1.50	2.2	2.231	3.275
1 $\frac{1}{2}$	1.90	48.26	.101	.145	2.56	3.685	1.87	2.6	2.782	3.719
2	2.375	60.32	.107	.154	2.72	3.910	2.50	3.6	3.719	5.210

Standard Iron Pipe

STANDARD Iron Pipe is known to the trade by its *nominal* inside diameter, which, however, is not its *actual* inside diameter. A pipe known as 1 $\frac{1}{4}$ -inch pipe will measure 1.38 inches diameter inside, while an extra strong pipe will measure 1.272 inches, the outside diameter of both styles being the same, 1.66 inches.

Pole brackets used for the suspension of trolley wires are usually made from what is known as standard steam gas and water pipe, the sizes in most general use being 1 $\frac{1}{4}$, 1 $\frac{1}{2}$ and 2-inch pipe (see Table on opposite page), the 1 $\frac{1}{2}$ -inch being used in the majority of cases.

Standard Trolley Poles are made from both the ordinary and the extra heavy pipe (see Tables on opposite page).

Tables

Standard and Extra Heavy Pipe

Butt and Lap Welded

English and Metric Systems—Standard Pipe

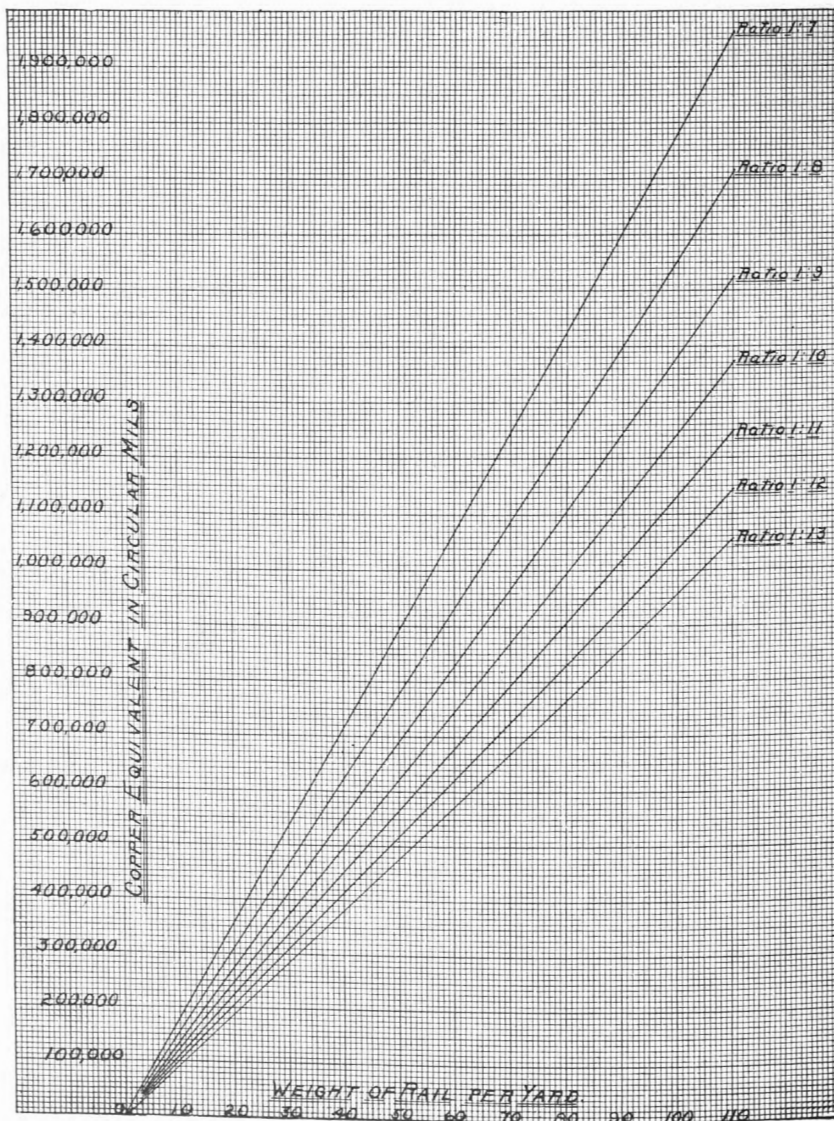
Nominal Inside Diameter		Actual Inside Diameter		Actual Outside Diameter		Thickness of Metal		Weight	
Inches	Milli-meters	Inches	Milli-meters	Inches	Milli-meters	Inches	Milli-meters	Pounds per Foot	Kilograms per Meter
$\frac{1}{8}$	3.174	.269	6.83	.405	10.28	.068	1.727	0.24	.355
$\frac{1}{4}$	6.349	.364	9.24	.540	13.71	.088	2.235	0.42	.621
$\frac{3}{8}$	9.524	.493	12.52	.675	17.15	.091	2.311	0.56	.828
$\frac{1}{2}$	12.700	.622	15.79	.840	21.33	.109	2.768	0.84	1.243
$\frac{5}{8}$	19.050	.824	20.93	1.050	26.67	.113	2.870	1.12	1.657
1	25.400	1.047	26.59	1.315	33.40	.134	3.403	1.67	2.471
$1\frac{1}{4}$	31.749	1.380	35.05	1.660	42.16	.140	3.556	2.24	3.315
$1\frac{1}{2}$	38.099	1.610	40.89	1.900	48.26	.145	3.683	2.68	3.966
2	50.799	2.067	52.50	2.375	60.32	.154	3.911	3.61	5.342
$2\frac{1}{2}$	63.499	2.467	62.66	2.875	73.02	.204	5.181	5.74	8.495
3	76.199	3.066	77.87	3.500	88.89	.217	5.511	7.54	11.159
$3\frac{1}{2}$	88.898	3.548	90.12	4.000	101.60	.226	5.740	9.00	13.320
4	101.600	4.026	102.26	4.500	114.30	.237	6.019	10.66	15.776
$4\frac{1}{2}$	114.300	4.508	114.50	5.000	127.00	.246	6.248	12.49	18.485
5	127.000	5.045	128.14	5.563	141.30	.259	6.578	14.50	21.460
6	152.400	6.065	154.05	6.625	168.27	.280	7.111	18.76	27.764
7	177.800	7.023	178.38	7.625	193.67	.301	7.645	23.27	34.439
8	203.200	7.981	202.71	8.625	219.07	.322	8.178	28.18	41.706
9	228.600	8.937	226.99	9.625	244.47	.344	8.737	33.70	49.876
10	254.000	10.018	254.44	10.750	273.05	.366	9.296	40.00	59.200

Extra Heavy Pipe

1	25.400	.951	24.155	1.315	33.40	.182	4.623	2.17	3.229
$1\frac{1}{4}$	31.749	1.272	32.309	1.660	42.16	.194	4.927	3.00	4.464
$1\frac{1}{2}$	38.099	1.494	37.947	1.900	48.26	.203	5.156	3.63	5.402
2	50.799	1.933	49.098	2.375	60.32	.221	5.613	5.02	7.470
$2\frac{1}{2}$	63.499	2.315	58.801	2.875	73.03	.280	7.112	7.67	11.413
3	76.199	2.892	73.456	3.500	88.89	.304	7.722	10.25	15.252
$3\frac{1}{2}$	88.898	3.358	85.293	4.000	101.60	.321	8.153	12.47	18.556
4	101.600	3.818	96.977	4.500	114.30	.341	8.661	14.97	22.276
$4\frac{1}{2}$	114.300	4.280	108.712	5.000	127.00	.360	9.144	18.22	27.113
5	127.000	4.813	122.250	5.563	141.30	.375	9.525	20.54	30.565
6	152.400	5.750	146.050	6.625	168.27	.437	11.099	28.58	42.529
7	177.800	6.625	168.275	7.625	193.67	.500	12.700	37.67	56.056
8	203.200	7.625	193.675	8.625	219.07	.500	12.700	43.00	63.988

Tables

Copper Equivalent of Steel Rails



Tables

Copper Equivalent of Steel Rails

THE chart shown on the opposite page was prepared for convenience in determining the copper equivalent of steel rails for various ratios of conductivity of steel to copper (from 1:7 to 1:13) and is based on the formula $\frac{W}{A} \times 124800 = C. M. \text{ copper equivalent.}$

W = Wt. of Rail in lbs. per yard. A = Ratio of steel to copper resistance.

Table A, (see bottom of page) shows the resistance of steel rails in ohms per mile (no allowance being made for resistance at joints) for the same ratios as the chart.

$$\frac{A}{W} \times 0.4379 = \text{ohms per mile.}$$

The ratio of resistance of steel to copper varies usually from about 13 in the case of high carbon rails to about $7\frac{1}{2}$ in the case of special soft rails made expressly for electrical conductors.

Table A.—Resistance of Steel Rails

Weight of Rail per Yard	Resistance—Ohms per Mile						
	Ratio 1 : 7	Ratio 1 : 8	Ratio 1 : 9	Ratio 1 : 10	Ratio 1 : 11	Ratio 1 : 12	Ratio 1 : 13
10	.3065	.3503	.3941	.4379	.4817	.5255	.5693
20	.1532	.1751	.1970	.2189	.2408	.2627	.2846
30	.1022	.1168	.1314	.1460	.1606	.1752	.1898
40	.0766	.0876	.0985	.1095	.1204	.1314	.1423
50	.0613	.0701	.0788	.0876	.0964	.1051	.1139
60	.0511	.0584	.0657	.0730	.0803	.0876	.0949
70	.0438	.0501	.0563	.0626	.0689	.0751	.0814
80	.0383	.0438	.0492	.0547	.0602	.0656	.0711
90	.0341	.0390	.0438	.0487	.0536	.0584	.0633
100	.0307	.0350	.0394	.0438	.0482	.0526	.0569
110	.0279	.0318	.0358	.0398	.0438	.0478	.0517

For the above formulae, which are correct to .2 per cent, we are indebted to
Mr. J. D. Keiley, Elec. Engr.

Tables

Sag in Spans

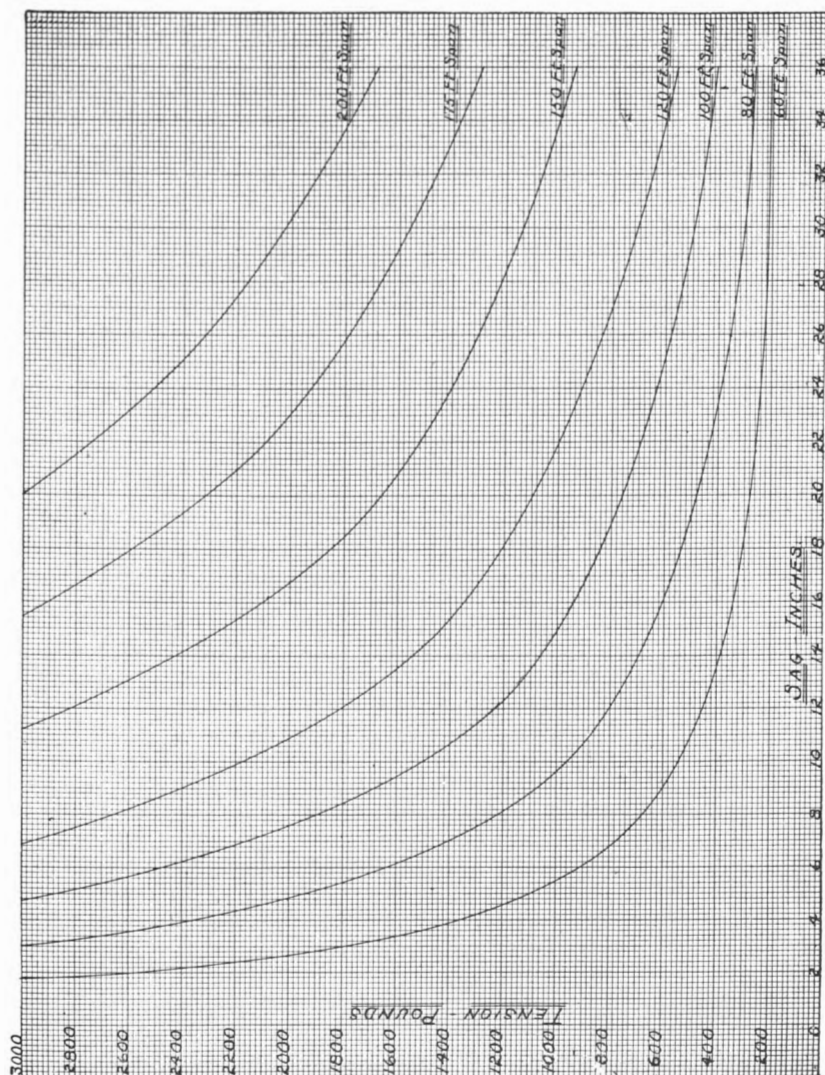
THE curves in the chart on the opposite page showing the relation between sag and tension in spans of various lengths, while general, are intended to apply particularly to catenary construction. They are based on the formula $T = \frac{S^2 W}{8d}$, where "T" equals total tension in pounds, "S" the span in ft., "W" the weight in pounds per foot and "d" the deflection or sag in feet. The weight per foot is taken at one pound which is very nearly the total weight per foot of catenary construction with $\frac{1}{8}$ " steel messenger 4-0 trolley and O. B. Co. suspensions spaced 10 ft. apart. The tensions and sags, however, for other weights per foot may be found by simply multiplying the values obtained from the curves by the weight per foot in question. The spans given, up to 150 ft., are adopted as standard very generally, the 150 ft. and 120 ft. for straight line construction and the shorter spans for curve construction.

The tensions and sags given by the above curves obviously hold true only at the time when the line is erected, as the effect of temperature is not considered in the formula. A rise in temperature tends to increase the sag and decrease the tension, while a fall in temperature has the reverse effect. The elasticity of the wire, however, allows it to elongate somewhat under any tension that results from a fall in temperature. Mathematical expressions which take into account temperature changes and the elasticity of the steel cable, are more or less complex, and it is found from practical experience in catenary trolley construction, that the tension and sag in the messenger does not as a usual thing check closely with calculated results. The effect of temperature changes upon the sag is found to be much less than the calculation would indicate.

The accumulation of sleet or snow upon the overhead construction adds considerably to its weight and consequently to the tension in the supporting messenger. In order to insure against accidents, it is therefore necessary to so adjust the tension of the wire when the line is erected that under ordinary circumstances no future stress will be sufficient to exceed the elastic limit of the material in the cable.

Deflection Curves

Tension Corresponding to Various Deflections at the Center of the Span



Tables

Decimals of an Inch and Millimeters for
Each 1-64th of an Inch

Frac- tion	32nds	64ths	Decimal		Frac- tion	32nds	64ths	Decimal	
			Inches	Millimeters				Inches	Millimeters
$\frac{1}{16}$	1	1	.015625	.3968	$\frac{9}{16}$	17	33	.515625	13.0966
		2	.013125	.7937			34	.531250	13.4934
		3	.046875	1.1906			35	.546875	13.8903
	2	4	.062500	1.5874		18	36	.562500	14.2872
$\frac{1}{8}$	3	5	.078125	1.9843	$\frac{5}{8}$	19	37	.578125	14.6841
		6	.093750	2.3812			38	.593750	15.0809
		7	.109375	2.7780			39	.609375	15.4778
	4	8	.125000	3.1749		20	40	.625000	15.8747
$\frac{3}{16}$	5	9	.140625	3.5718	$\frac{11}{16}$	21	41	.640625	16.2715
		10	.156250	3.9686			42	.656250	16.6684
		11	.171875	4.3655			43	.671875	17.0653
	6	12	.187500	4.7624		22	44	.687500	17.4621
$\frac{1}{4}$	7	13	.203125	5.1592	$\frac{3}{4}$	23	45	.703125	17.8590
		14	.218750	5.5561			46	.718750	18.2559
		15	.234375	5.9530			47	.734375	18.6527
	8	16	.250000	6.3498		24	48	.750000	19.0496
$\frac{5}{16}$	9	17	.265625	6.7467	$\frac{13}{16}$	25	49	.765625	19.4465
		18	.281250	7.1436			50	.781250	19.8433
		19	.296875	7.5404			51	.796875	20.2402
	10	20	.312500	7.9373		26	52	.812500	20.6371
$\frac{3}{8}$	11	21	.328125	8.3342	$\frac{7}{8}$	27	53	.828125	21.0339
		22	.343750	8.7310			54	.843750	21.4308
		23	.359375	9.1279			55	.859375	21.8277
	12	24	.375000	9.5248		28	56	.875000	22.2245
$\frac{7}{16}$	13	25	.390625	9.9216	$\frac{15}{16}$	29	57	.890625	22.6214
		26	.406250	10.3185			58	.906250	23.0183
		27	.421875	10.7154			59	.921875	23.4151
	14	28	.437500	11.1122		30	60	.937500	23.8120
$\frac{1}{2}$	15	29	.453125	11.5091	1	31	61	.953125	24.2089
		30	.468750	11.9060			62	.968750	24.6057
		31	.484375	12.3029			63	.984375	25.0026
	16	32	.500000	12.6997		32	64	1.000000	25.3995

Tables

Metric System of Weights and Measures

Measures of Lengths

1 Millimeter	=	0.001 Meter	=	0.0394	Inch.
1 Centimeter	=	0.01 Meter	=	0.3937	Inch.
1 Decimeter	=	0.1 Meter	=	3.937	Inches.
1 Meter	=	1. Meter	=	39.37	Inches.
1 Dekameter	=	10. Meters	=	393.7	Inches.
1 Hectometer	=	100. Meters	=	328 Feet, 1 Inch.	
1 Kilometer	=	1000. Meters	=	3280 Feet, 10 Inches.	
1 Myriameter	=	10000. Meters	=	6.2137	Miles.

It will be noticed that 10 Millimeters equal 1 Centimeter, 10 Centimeters equal 1 Decimeter, and so on.

Measures of Volumes

1 Milliliter	=	0.001 Liter	=	0.061 Cubic Inch.
1 Centiliter	=	0.01 Liter	=	0.6102 Cubic Inch.
1 Deciliter	=	0.1 Liter	=	6.1022 Cubic Inches.
1 Liter	=	1. Liter	=	0.9081 Quart.
1 Dekaliter	=	10. Liters	=	9.081 Quarts.
1 Hectoliter	=	100. Liters	=	2 Bushels, 3.35 Pecks.
1 Kiloliter	=	1000. Liters	=	1.308 Cubic Yards.

Weights

1 Milligramme	=	0.001 Gramme	=	0.0154 Grain.
1 Centigramme	=	0.01 Gramme	=	0.1543 Grain.
1 Decigramme	=	0.1 Gramme	=	1.5432 Grains.
1 Gramme	=	1. Gramme	=	15.432 Grains.
1 Dekagramme	=	10 Grammes	=	0.3527 Ounce.
1 Hectogramme	=	100. Grammes	=	3.5274 Ounces.
1 Kilogramme	=	1000. Grammes	=	2.2046 Pounds.
1 Myriagramme	=	10000. Grammes	=	22.046 Pounds.

Metric and English Equivalents

Inches	=	Millimeters \div 25.4	Lbs. Avoirdupois	=	Kilogrammes \times 2.20462
Feet	=	Meters \times 3.28083	Tons (2000 lbs.)	=	Kilogrammes \div 907.18
Yards	=	Meters \times 1.09361	Lbs. per Foot	=	Kilo. per Meter \times .67196
Miles	=	Kilometers \div 1.60935	Lbs. per Cu. Ft.	=	Kilo. per Cu. Meter \times .06243
Sq. In.	=	Square Millimeters \times .06155	Sq. Millimeters	=	Square Inches \times 645.137
Sq. Ft.	=	Square Meters \times 10.7641	Sq. Meter	=	Square Feet \times .0929
Acres	=	Square Kilometers \times 247.114	Grammes	=	Ounces \times 28.3495
Cu. In.	=	Cubic Centimeters \div 16.3870	Grammes	=	Pounds \times 453.5926
Cu. Ft.	=	Cubic Meters \times 35.3140	Kilogrammes	=	Pounds \times .45359

Tables

Data for Conversion of English and Metric Systems

IN transposing the properties of wire from the English to the Metric System and vice versa the following formulae will be found convenient:

1 Mil = 1-1000 part of an Inch	= .001 Inch.
Circular Mils	= Diameter in Mils, squared.
1 Inch	= 25.4 Millimeters.
1 Kilogramme	= 2.2046 Pounds.
1 Square Mil	= 1.2732 Circular Mils.
1 Circular Mil	= .7854 Square Mil.
1 Millimeter	= 39.37 Mils.
1 Kilogramme per Kilometer	= .67196 Pound per 1000 Feet.
1 Pound per 1000 Feet	= 1.4882 Kilogrammes per Kilometer.
Diameter in Millimeters	= Diameter in Mils \div 39.37
Diameter in Mils	= Diameter in Millimeters \times 39.37
Area in Square Millimeters	= $(\text{Diameter in Millimeters})^2 \div 1.273$
Diameter in Millimeters	= $\sqrt{\text{Area in Square Millimeter} \times 1.273}$
Area in Square Millimeters	= Area in Circular Mils \div 1973.5
Area in Circular Mils	= Area in Square Millimeters \times 1973.5
Pounds per 1000 Feet	= Weight in Kilogrammes per Kilometer \div 1.4882
Kilogrammes per Kilometer	= Weight in Pounds per 1000 Feet \div .67196
Pounds per 1000 Feet	= Area in Circular Mils \times .003027
Feet per Pound	= 330360 \div Circular Mils.

Arcing Distance of High Voltage Alternating Current Between Sharp Needle Points in Air

Adopted by A. I. E. E.

Effective Volts	Inches	Effective Volts	Inches	Effective Volts	Inches
5000	.225	50000	3.55	140,000	13.95
10000	.47	60000	4.65	150,000	15.00
15000	.725	70000	5.85	175,000	17.80
20000	1.000	80,000	7.10	200,000	20.50
25000	1.3	90,000	8.35	250,000	25.60
30000	1.625	100,000	9.60	300,000	31.00
35000	2.00	110,000	10.75	350,000	36.10
40000	2.45	120,000	11.85	400,000	41.20
45000	2.95	130,000	12.95		

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